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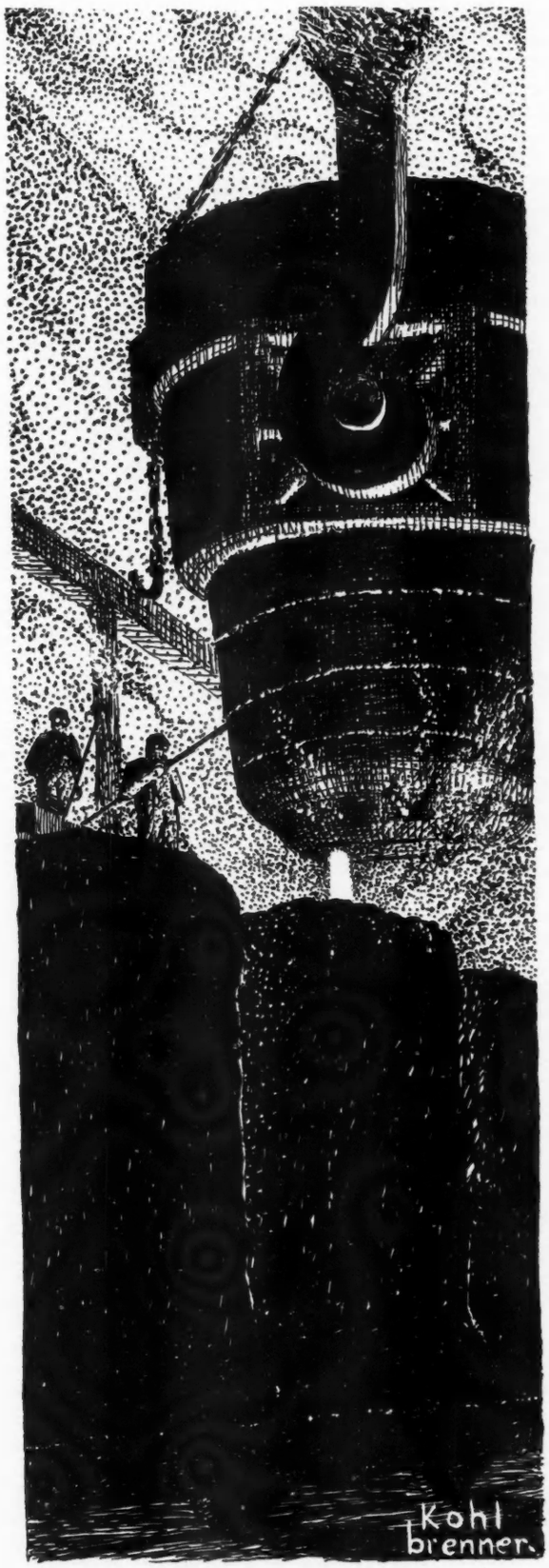

Industry Regains Place as Largest Consumer of Steel

Ratio of utilization of ferrous alloys to general demand shows little change

by William Crawford Hirsch

NOTWITHSTANDING the smaller number of units produced by them in 1931, automotive manufacturers bought more rolled steel in 1931 than did any other steel-consuming industry. In 1930 building and construction had absorbed a greater tonnage, although its value hardly approached that which went into automotive consumption; but with the building industry having been compelled to mark time in 1931, and the railroads, which in 1930 had taken the third largest volume, shorn of much of their purchasing power, automotive consumption accounted not only, as it had done for a number of years previously, for heavier dollars and cents takings of rolled steel than any other consuming industry, but also led all others in point of tonnage. Keenly as the rolling mills felt the recession in motor vehicle output, loss of business in other consuming outlets was even more pronounced, and this served to accentuate the leadership of automotive consumption in the steel market.

A statistical close-up, in so far as reports are available at this time, leaves no doubt that 1931 was the poorest year in point of steel consumption since 1921 and that with the latter it shares the inglorious distinction of the two worst steel years of the Twentieth Century. Measured in terms of ingot output, 1931 steel production shrunk to approximately 25,000,000 tons, as compared with 40,500,000 tons in the preceding year and 55,000,000 tons in 1929. The average annual production in the five-year period of 1925-29 was 48,000,000 tons, so that in 1931 steel demand was just about half of what it was in any one of those more prosperous years. Only 38 per cent of the theoretical capacity of the steel industry, assumed for 1931 to have been 66,000,000 tons, could be employed.

The output of rolled steel, which was 30,000,000 tons

in 1930 and 41,000,000 tons in 1929, dipped in 1931 to somewhere around 19,000,000 tons, of which, it is estimated, approximately 3,250,000 went into automotive consumption, as compared with 4,750,000 tons in 1930.

Indications are that little change has taken place in the ratio of the demand for alloy steels to general steel consumption. According to the statistics of the American Iron & Steel Institute, one out of every 14 tons of steel bought in 1929 and one out of every 16 tons bought in 1930 consisted of alloy steel. Assuming 6½ per cent of the 25,000,000 tons of ingot production to have consisted of alloy steels, 1931 output would total 1,625,000 tons, yielding after allowance for between 30 and 40 per cent shrinkage in the conversion of the primary forms into rolled products, due to heavy discard of crop ends and mill scale, between 1,000,000 and 1,100,000 tons of rolled alloyed steel. Automotive consumption of alloy steels has ranged in the last few years from three-fifths to close to three-quarters of the entire production. In fact, 90 per cent of all rolled alloy steel consists of bars and of these fully 75 per cent go into automotive consumption. In some of the industries that, unlike manufacturers of motor vehicles, are not quite so dependent upon alloy steels for the maintenance of their products' service prestige, there was much enthusiasm for "fancy" steels during the heyday of prosperity and considerable experimenting with their use. Recent pressure on prices has caused much of this enthusiasm to evaporate and to eliminate from designs and plans all costly refinements. Not so with automotive consumers of alloy steels. More and more parts have been endowed with longer life and greater efficiency through the use of alloy steels. While total consumption declined more or less in proportion to the lighter production of automotive units in 1931, the number of pounds of alloy steels contained in some models was increased, so that in spite of the drop in the number of cars produced the share of automotive consumption in the total output of alloy steel mills very likely approximated 800,000 tons in this off-year.

Nickel steels, with a 3.25 @ 3.75 per cent nickel content, were in good demand, having long ago come to be accepted as the standard material for numerous automotive working parts. An increase was noted in the demand for steels with a higher nickel content: 4.75 @ 5.25 per cent (S.A.E. 2512) which are coming in for wider application in heavy-duty trucks.

Among the nickel-chromium steels those having a nickel content of from 1 @ 1.5 per cent and 0.45 @ 0.75 per cent chromium came to the front in point of automotive demand.

Increased Automotive Use of Molybdenum

Increased automotive use is also noted in molybdenum steels. An alloy steel with a nickel content of from 1.5 @ 2 per cent and 0.20 @ 0.30 per cent molybdenum (S.A.E. 4615) is much in favor for gears and bearings.

Automotive consumption of nickel continues to account for approximately 30 per cent of the metal's sales, the bulk of it in the form of rolled nickel steel, although the metal's use for improving the product of automotive foundries is steadily gaining in importance.

The so-called stainless or rustless steels, being either high-chromium or high-chromium nickel alloys, marketed by their patentees or licensees under different proprietary names, are holding and adding to the vogue enjoyed by them in radiators and other exposed automotive fittings. As a curiosity in this connection it may be stated that, although this type of alloy steels originated in Germany and is best known as a Krupp product, British alloy steel manufacturers have recently undersold the Germans in the latters' home market by 40 per cent. While on the subject of alloy steels, mention may also be made of the steadily growing importance of the tungsten-carbide type of high-speed tools which are neither an alloy nor do they contain steel, but which have greatly increased the scope of tungsten's usefulness and resulted in revolutionary changes in automotive tool and machine shop practice. These cemented cutting mediums have made possible the machining of cast iron and of the toughest of tough manganese steel. Further progress was also made in the development of the "nitriding" process by which certain alloy steels as well as gray and malleable cast iron are case-hardened with ammonia in special furnaces. As these technical advances become commercially more commonplace, they are certain to exert considerable influence on the set-up of the steel market.

In comparison with the violent fluctuations that featured the securities and most of the commodity markets in 1931 the price movement in steel was a decidedly tame affair. Up to Dec. 1, not more than a $1 per ton spread had been recorded between the year's high and low in steel bars. During the year's closing month, however, more or less of a struggle for what automotive orders were then thought to be overhanging the market ensued among rolling mills and concessions became the rule rather than the exception in the Middle West markets.

New Marketing System in May

The year's outstanding development in the sheet market was the introduction of a new marketing system on May 1. Reforms were made necessary partly by the introduction of the continuous method of rolling sheets and partly by abuses that had crept into the marketing of all descriptions of sheets, but especially so of automobile body stocks. Extras for finishes, drawing qualities, sizes, leveling, etc., had been used more or less as a subterfuge for price cutting and to get around the necessity of going under the generally quoted base price. The classification of automobile body sheets in the new schedule applies to material that is inspected to buyer's standard with seconds assorted and subject to the extras referred to. A new classification of cold-rolled sheets was set up. This permits material that may be used as a substitute for automobile sheets, but which is sold as "mill run" and not subject to special extras to be marketed under a designation that does not mislead the buyer, restricting the classification as automobile body stock to sheets that have been specially finished and selected for that purpose.

From the year's opening price of 3.30 cents, Pittsburgh, the market for automobile body stock had receded $4 @ $6 a ton to 3 @ 3.10 cents when the new nomenclature became operative and its adoption was followed by affirmation of the 3.10 cents price which in December sagged to 3 cents. Prices established for cold rolled No. 10 and No. 20 sheets under the new classification: 2.35 and 2.95 cents, Pittsburgh, respectively, were fairly maintained throughout the remainder of the year. What were formerly known as black sheets and under the new nomenclature designated as No. 24 hot-rolled annealed sheets advanced $5 a ton to 2.40 cents, Pittsburgh, on July 1 and have since ruled fairly steady at that level. Blue annealed sheets

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Make an EIGHT, says FORD

Stop orders on releases on four-cylinder parts already flowing from suppliers show dramatic over-night change in Dearborn magnate's plans

Hopes to Have Cars by Showtime

by Athel F. Denham

Special to *Automotive Industries*

DETROIT, Dec. 17—*Automotive Industries* has received confirmation which, while not official, is nevertheless definite that the Ford Motor Co. is discontinuing the manufacture of its four-cylinder automobiles and is rushing work on the new eight for possible presentation around show time.

The release of production orders to parts suppliers about two weeks ago for parts on the Model B four-cylinder engine was followed within only a few days by orders canceling all deliveries for the time being on most parts. This gave rise to the rumors that production difficulties were being encountered and that consideration was being given to offering an eight-cylinder engine optionally on the Ford passenger car chassis.

Ford's dramatic decision to abandon the four-cylinder passenger car model was widely discredited by the industry in view of Ford's evident desire to get into production as rapidly as possible. In the last few days, however, Ford has been hiring all available tool designers to rush tooling-up on the new cars.

Parts suppliers who have tooled up in anticipation of production on the Model B four-cylinder engine for passenger cars will not be completely out in the cold, however, as the four-cylinder engine will be continued for commercial cars, according to the latest information available.

The introduction of the new eight will also make possible the expansion of Ford's commercial activities into higher tonnage ranges.

In addition to engine changes the decision to switch to an eight will involve a number of chassis and body changes, although the major design features arrived at for the four will be continued in the eight. Body manufacturers of course are protected on tools, practically all of which are owned by the Ford Motor Co.

While it does not appear likely that Ford will be able to reach any quantity production by early January, previous experimental work and tool design in anticipation of the possibility of offering an eight-cylinder car will make it possible for him to ship cars for dealer sampling at an earlier date than would otherwise have been possible. Recalling the manner of the Model A introduction, it is quite possible that announcement of the new line will be made around the first of the year.

Adoption of the eight will not affect design of chassis units such as transmission, automatic clutches and axles, as these have been designed to take the increased torque. It is understood that Ford's original plans called for a separate eight on a wheelbase of around 117 in. Later it was decided to make fours and eights optional in virtually the same chassis. While no information is available on prices it is expected that the new eight will sell in the same price range as the

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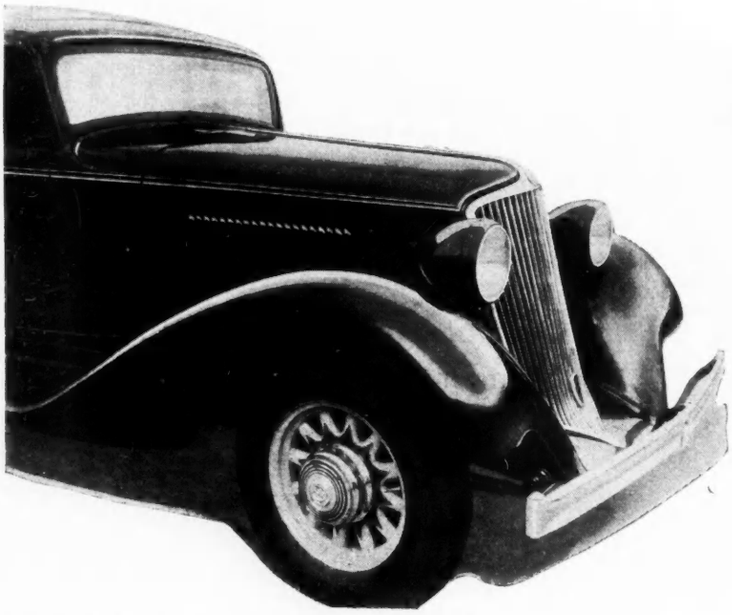


Detail of front end of the new Graham Eight

Concealed Chassis

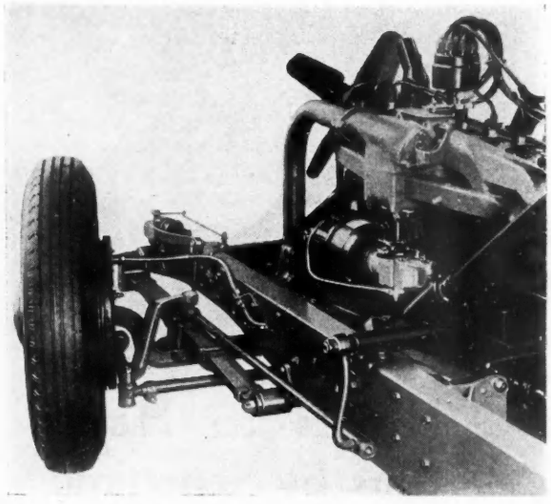
Outriggers carry running boards on 1932 lines, which are 2 inches lower and have wider tread; spring suspension designed to discourage wandering wheels

THE new line of cars with 125-in. wheelbase which is being put out for 1932 by the Graham-Paige Motor Corp. lists at prices ranging from $995 to $1,195, although it is powered with an eight-cylinder engine developed from that used in a 1931 line selling at $100 to $200 more. It comes with bodies of advanced design, with a new frame with rather remarkable details, and with a spring suspension worked out in conjunction therewith; and its equipment includes such modern features as free wheeling in all forward speeds, silent second speed, synchronized shifting, and ride control.

Other features of the new line include centrifuse brake drums consisting of pressed steel drums with cast iron spun into them for greater stiffness and better frictional qualities; a new method of body trim which simplifies the tightening of concealed body bolts; concealed draw shades in rear quarters of sedans, a non-leaking concealed windshield wiper mounting, and a really completely concealed chassis. The rear of the car can be jacked up without placing a jack under the rear axle. Body lines have been improved materially, as may be judged from the photo. The cars are about 2 in. lower than last year's models. Chrome plating is restricted to a minimum, even the headlamp rims and radiator shell being lacquered.

In the chassis the new frame is probably the most interesting feature. It is cradled between the springs, which to that end are mounted considerably farther apart (more than 8 in. farther in front and 3 in. farther in the rear). To make this wide spring spacing possible, the tread was increased to 61 in. at the rear and 60⅝ in. at the front.

Attaching the front springs to outrigger brackets on this manner permits of straightening out the side rails and of eliminating the front kick-up. At the rear the kick-up has been eliminated by increasing the depth of the side rail and stamping an opening in the web for the axle housing to pass through. Therefore, instead of carrying the deep channel over the axle, the new design, which provides a greater total depth, reduces the height of the top flange above the axle and still assures ample axle-housing clearance. Rubber bumpers are fitted at both top and bottom of the opening for the axle housing.



Detail of front end of chassis, showing the new spring suspension and steering gear geometry. The design makes for remarkably easy handling at high speeds

The net result is an almost flat top to a low frame, which simplifies body design, increases frame rigidity, and lowers the center of gravity. With this structure, moreover, the body sills can be relied upon to a greater extent for bracing between the top flanges of the side rails, hence the main parts of the cross-members are located in the plane of the lower flange, with diagonal gusseting members extending to the upper flanges. Two of these cross-members are extended beyond the frame side rail to form outriggers for carrying the running boards and sheet metal. The cross-members themselves are U-section stampings, being made up

Stabilizes Graham "Blue Streak"

by Athel F. Denham

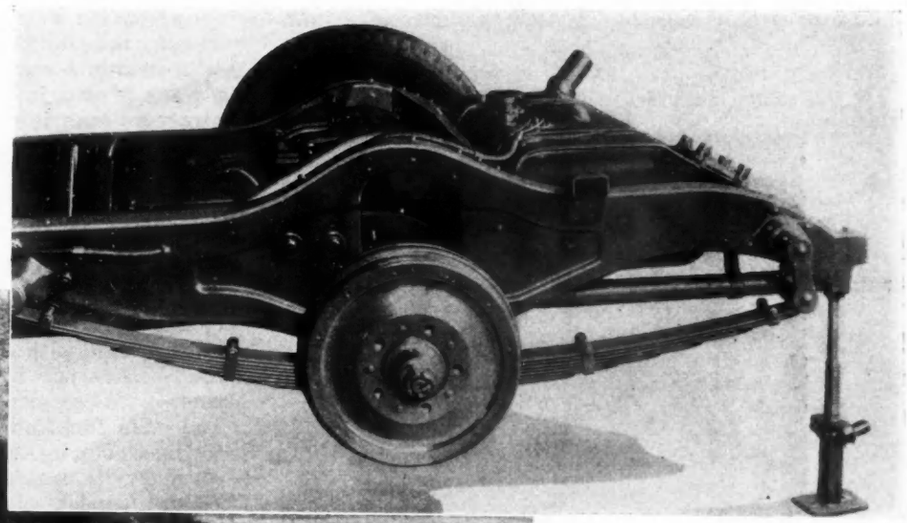
to some extent from material salvaged from the side-rail stampings.

Aside from the increased stability of the car resulting from the combination of a low center of gravity, relatively high spring location (with relation to the center of gravity) and the wide spring spacing, an interesting design detail is made possible by the new layout. The steering gear housing is mounted on top of the side rail, instead of projecting through it, and the straight drag link extends horizontally from the end of the pitman arm to a point over the front spring pad. With both front springs shackled at the front end, the drag link travels on nearly the same arc as the spring pad or axle end, reducing the tendency to wander or kick back through the steering gear.

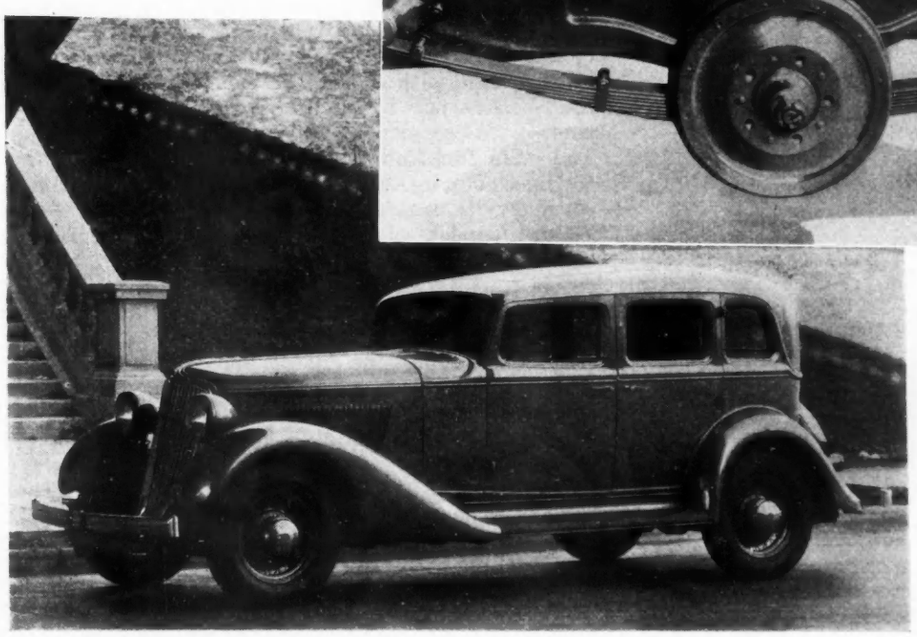
One of several minor features which happen to work out well with this type of frame design is the entire concealment of the rear end of the chassis with body and sheet-metal panels extending much lower than usual. With a conventional frame such a design would have made it almost impossible to jack up the rear axle. In the Graham Eight the rear bumper brackets are provided with flanges on their lower side, under which the jack can be placed. This, of course, results in lifting the frame, but after the clearance in the side rail opening has been taken up, the frame raises the axle. The axle is then in its lowest position relative to the rest of the car, and the rear fenders therefore can be provided with deeper side flanges, which conceal the running gear more effectively and also protect the body. There are perforated rubber bumpers at the frame cutout which provide a cushion in case the axle abuts at either top or bottom.

Clearance for the rear-axle center housing is provided by forming a relief cutout in the wide cross-member located at this point in the plane of the upper side-rail flanges, and a shallow, sheet-metal-inclosed cutout in the rear-seat pan.

The propeller shaft is located above the cross-members, instead of below them. Springs are softer in action, which was made possible by the simultaneous adoption of ride control from the dash.



Novel design of the side rail through which the rear axle is suspended, lowers center of gravity without sacrificing strength. Note new centrifuse brake drums and method of jacking up car



This side view of the new Graham Eight Blue Streak sedan, listing at $1,045, hardly does justice to the attractive lines of the new cars. There is very little chrome plating on these models

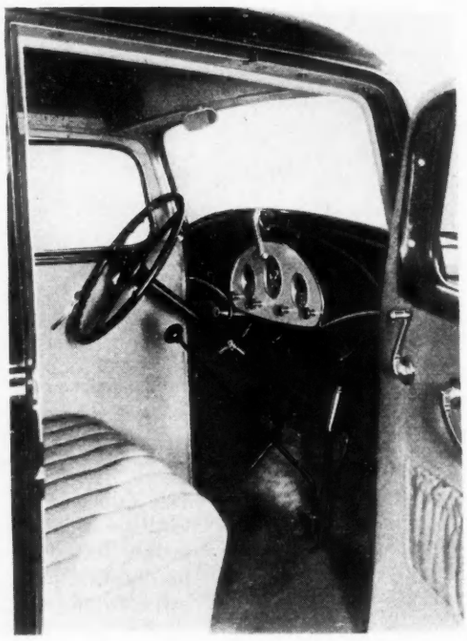
As was intimated in the opening paragraph, the engine is practically the same as that in the 1931 Graham Special Eight. However, the cylinder heads are now cast of aluminum alloy to prevent detonation under high compression, and dual concentric valve springs are used. A larger and more effective combined intake silencer and air cleaner is an item of the equipment. The fan has been made more silent by modification of the shape of the blade trailing edge near the tip. A new cylindrical type "resonator" muffler of Oldberg manufacture is now fitted. To improve the general appearance of the front end of the car, the radiator filler is now placed under the hood. The radiator core is arranged to slope backward, so as to parallel the fan, the engine being mounted with its axis inclined.

Clutches remain unchanged. Transmission assemblies are composed of three-speed, helical-gear Warner-Gear transmissions incorporating synchronizing clutches for second speed and direct-drive engagement, combined with the latest type of Warner-Gear free wheel overrunning clutch located at the rear of the transmission. This free-wheeling unit has eight cams with single rollers. The cams are of involute shape for easy disengagement and effective wedging action, together with decreased wear. Lock-out control is through a push and pull button located on the dash.

Transmissions have anti-friction bearings throughout, except for the reverse idler and countershaft. Ratios are 1.646 to 1 in second, 2.864 to 1 in low and 3.437 in reverse. Together with a rear axle ratio of 4.3 to 1, this permits a good getaway in second speed if desired, while a maximum speed of 50 m.p.h. can be obtained in this gear.

Brakes are larger than on any 1931 Graham cars, with lining 2 in. wide and an aggregate length of 111 in. for the four wheels. The new "centrifuse" drums, manufactured by Campbell, Wyant & Cannon foundry and the Motor Wheel Corp., are being fitted. These drums are virtually composed of three parts made up into a single unit. The brake drum "ring" and backing plate are separately stamped, and then welded together by projection welding. Prior to this, molten cast iron is spun into the preheated drum, the same as babbitt is spun into a connecting rod head. This centrifugal casting of iron is said to provide a much closer grain structure than is normally obtainable. Thus the new drums combine the desirable low weight attainable with pressed steel with the anti-scoring and improved wear characteristics of cast iron. A 3 per cent graphite content in the cast iron is said to add to the life of the lining between adjustments.

Cowls on the new Graham Eight are heavily reinforced and of one-piece structure. This view shows some of the details



Front compartment of new Graham Eight sedan. Note the removable metal covering over the door to make roof bolts accessible

The parking brake remains at the transmission, as in former designs of Graham cars, with 18 9/16 in. of 2-in. lining. Steering gears are of roller-cam-and-lever design, with a 17 to 1 ratio. Front axles are of the I-beam type. Five wire wheels are standard equipment, with drop-center rims carrying 6.00/17 in. tires. The main fuel line now is outside the frame channel for maximum cooling. Below the hood the fuel line is covered with insulating material.

Cowl, windshield pillars, windshield header bar, and cowl belt bar are stamped out as one unit, and the entire cowl assembly is welded together. Pillars are made complete box sections by the welding on of reinforcement plates. Doors are also of all-steel construction, having one inside and one outside panel, flanged and welded together. Adjustable dovetails are used at the top as well as at the side of the doors.

Body structure generally is of the familiar composite type, except that all important joints are fastened together by means of bolts rather than screws. These bolts (also door and window controls) are made quickly accessible by the use of a new design of spring clip for attaching body trim composition panels to the metal surfaces. These clips are slipped into small rectangular

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Just Among Ourselves

The Boss Must Help

HARPING again on the discussion about field contacts by engineers, which we labored at some length back in the Nov. 21st issue, we are struck by the added thought that the engineer's boss frequently has as much to do with lack of contact by his technical men as has the engineer himself.

After all, the engineer's boss must so thoroughly field contact on the part of his engineers as to consider time and money so spent to have been well invested.

He must supply more than permission to his engineering department to make customer contacts. He must *order* the making of such contacts.

Only thus can he remove once and for all some of the most ready alibis which the average engineer can give himself for sticking to the office.

By so doing he removes at one fell swoop the "afraid-to-spend-the-money" alibi; the "the boss-might - be - looking - for - me - and - blame-me-for-being-away" alibi; the "I'm-afraid-the-boss-might-think-I-was-out-joy-riding" alibi and many others which come so readily to hand when the engineer feels himself breaking into a cold sweat at the idea of pushing his way personally into the company of strangers who have not specifically invited his presence.

Line Up Other Departments

IT'S perfectly true that the whole company will benefit from closer contact between design engineers and users. But since much of that benefit, admittedly, is going to come to departments other than the engineering, it's only fair that the chief executives of the company itself and the executives of other departments should help actively in making such contact both possible and effective.

It's not all the engineer's fault, by a long way.

Like specialists in every other department of the business, he is usually well equipped to perform effectively most phases of his job.

And, like specialists in every other department of the business, he needs stimulation from above and help from coordinate executives to best achieve certain tangential duties.

Not 5,000,000 But Might Be If—

WE have just received a letter from Milan V. Ayres, analyst, National Association of Finance Companies, which revives our faith in economists in general, and in this especially fine economist in particular.

Mr. Ayres informs us in no uncertain terms that *Automotive Industries* definitely misquoted him a couple of weeks ago when it quoted him as having predicted a motor vehicle output of 5,000,000 in 1932. It was hard for us to believe the quotation when we read it, because Mr. Ayres has always in the past given every evidence of basing his predictions on sober and sound reasoning.

What Mr. Ayres actually did say was:

"If the average life of cars is from six to seven years, as it has been nearly all the time since cars first came into use, then we need annually in this country, merely for replacement, from 3,500,000 to 4,000,000 new automobiles. During 1930 and 1931 we have not made nearly enough cars to take care of replacements, to say nothing of providing for increase in the total number of cars in use.

"This makes it seem logical to say that next year we ought to produce at least 5,000,000 cars to make up for the accumulated deficit.

"The trouble with the argument is that the assumed life of six or seven years is not absolute. Cars do not actually wear out in that length of time. We have been scrapping cars more because they were obsolete than because they were worn out, and we can easily make the average life considerably longer than we have been accustomed to. That is what we have been doing this year, and we can continue to do it if necessity requires next year and the year after.

"On the other hand there are, of course, millions of people who don't like the necessity and who are anxious to replace their old cars with new ones. Many of them will do so as soon as they are assured that prosperity is on the way back.

"I believe that this urge for more up-to-date equipment will be sufficient to assure greater production and sales of automobiles in 1932 than we have experienced this year.

"On the other hand, it seems probable that the recovery from the depression will be gradual."

Mr. Ayres, we apologize!

—N.G.S.

Gentlefolk Find Built-in Comfort On S

Veteran observer points out that beauty still rules when the de luxe market is considered, and that engineering developments toward better airfoils and elimination of engine noises and odors will continue to be guided by it

BUILT-IN riding comfort was one of the outstanding aspects of the coachwork shown in the New York Salon recently.* Body builders are holding to rather conservative hues of fabrics, but have made numerous innovations in providing for the comfort of the passengers.

Practically all the models shown had center arm rests in the rear-seat construction. This in itself is not a new development, but the widespread adoption of this feature and details in working it out were of particular interest.

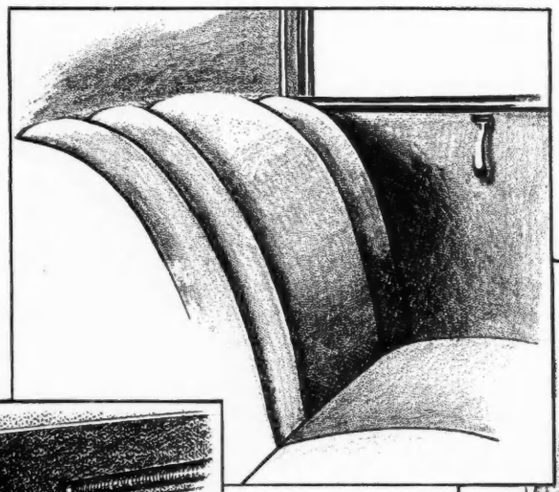
The plain back and cushion, often with a roll to the cushion, was the most prevalent trimming design. Several makers, however, have developed pleasing combinations of plaits and plaits and buttons to break up the large surfaces of the modern motor car interior.

Artistic selection of choice woods continues to play an important part in the age-old craft of coach building. A few examples demonstrated how a careful grouping of elaborate grains and colors can be brought into most agreeable harmony.

The vogue for rich, solid-colored broadcloths, Bedford cords, short-pile velvets and doeskin has gained wide favor in fine coachwork of today, the Salon showed.

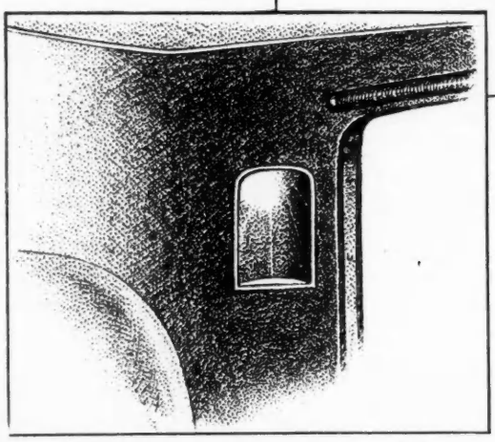
Exteriors showed results of diligent study of streamline and airfoil design. Several examples approached the unconventional streamline form without violating good taste. Usually, a design executed by an aerodynamic engineer leaves much to be desired from the

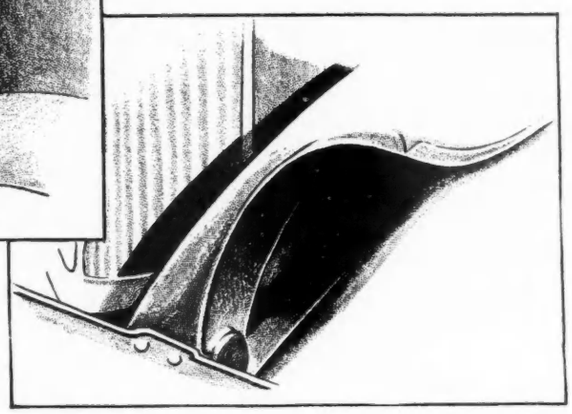
*Photographs of coachwork appeared in the Nov. 28 issue, *Automotive Industries*.



Form-fitting seat back with wide center bolster and narrow supporting bolsters at each side as developed by LeBaron. The wide bolster is fitted with softer springs than are used to back up the two narrow bolsters. The occupant, leaning against the center bolster, sinks back and the upholstery adjusts itself to the shape of the passenger's back, the stiffer springs in the narrow bolsters supporting the shoulders

Below — Concealed lighting arrangement wherein the light is within a recess placed at about the eye-level of the seated passenger

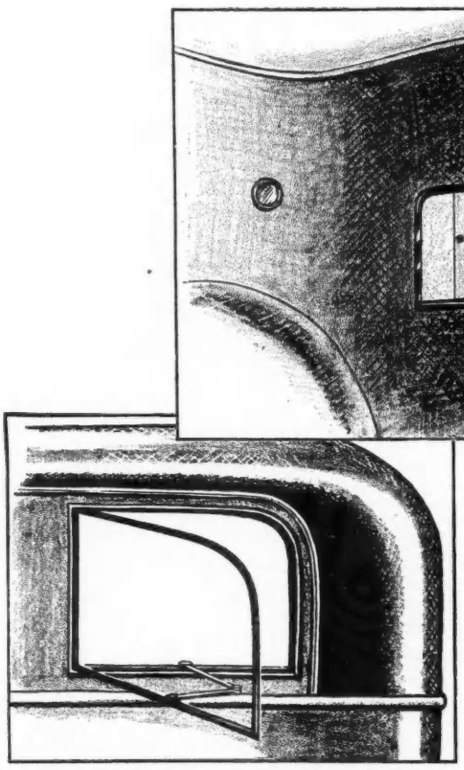




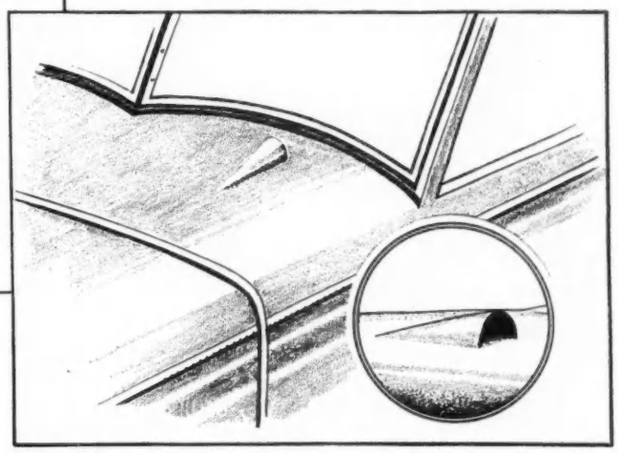
This sketch shows the apron of the fender on the Ambi-Budd body on a Chrysler chassis. The apron on its extreme front end is formed to a box-like shape that entirely covers the chassis frame of the car. The shape on this front line gradually narrows as it goes upward. This portion of the apron that covers the end of the chassis frame at the bottom also forms the rounded edge of the apron above the lower box. It is folded back and continues toward the rear and thus becomes the reinforcement for the apron at this forward end. Photos of this car were shown in our issue of Nov. 28

Streamlined New York Salon Chassis

by George J. Mercer



Showing a detail on a Brunn body mounted on a Lincoln, having the window open by swinging outward at the rear



Above—
Concealed miniature cabinet, having folding wood doors that form a part of the wood trim design. These doors are so made that they automatically switch on a light within the enclosure. This cabinet is used for a toilet case and a cigarette humidor and ash receiver

A method for warming the windshield glass by the heat carried back from under the engine hood was introduced on a Hayes body on a Marmon chassis. Two outlet vents are provided on the cowl through which warm air is vented from the engine

standpoint of general conception of beauty as well as comfort to the passengers. Coach builders who peered into the future, however, achieved distinguished results by molding major lines of the exterior in long, sweeping curves and carrying out the motif of streamlining into the radiator, windshield lines and the rear of the car.

In many cases, head lamps, fender detail, cowl ventilators and the trunk at the rear of the car were so designed as to blend smoothly into the long sweep of the fenders and roof-line of these models. The Delage streamlined fenders had doors on the side of front and rear fender and utilized the space in this closed portion of the fender for luggage space.

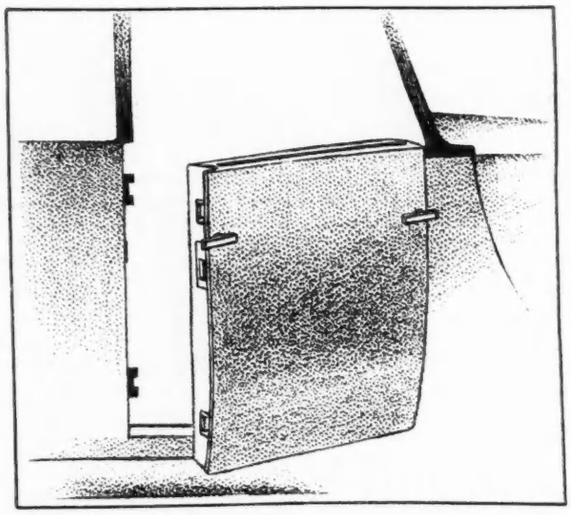
It has been assumed, apparently, that engineering advantages of streamlining, i.e., the greater efficiency through decreased wind resistance, decreasing of engine noises and vibrations, and the elimination of engine odors by mounting the powerplant in the rear, etc., will follow rather than precede sales points of sheer beauty.

The clientele for custom coachwork can be appealed to more quickly and more effectively through discussion of artistic symmetry of line and beauty of the streamline curves than through scientific formulae of wind resistance factors and aerodynamic theory.

Rather extreme streamlining design for conventional chassis were shown by Rolls-Royce, Delage and Franklin, although many examples of this trend were seen everywhere throughout the Salon. Most of the new bodies, for example, had eliminated protruding visors above the windshield, showed smooth, rounded frontal lines sloping rearward of the front pillars, and many radiators were carried forward at the lower front. Several examples of streamlined bodies suffered conventional design of windshield, hood, radiator and fenders, indicating that the designers did not feel sure of their ground in introducing the streamline motif.

Generally speaking, the body colors this year were rather more gay than might have been expected. The wide choice of color schemes obtainable in production models has a counterpart in the custom field, with the result that there will be a brilliant color scheme on the highways in 1932.

Interiors, as noted above, offered a great deal of interest. One of the LeBaron examples had triple-section spring construction for the rear seat back upholstery.



Doors on a Brunn body on a Lincoln chassis can be opened from either the back or front. This illustration shows the door open. Dovetails near the top and bottom are larger than customary, as these act as hinges.

There are duplicate dovetails and locks at each face of the door, front and rear, and the female member of the dovetail, located on the body pillars, is made in two parts, forming a hinge. When the lock is released at either one side or the other, the male member of the dovetail locks with the female member and functions as one unit. The door swings on the dovetail-hinge opposite to the side on which the lock has been released. Either side will operate readily, and there is a provision that prevents the door from being disengaged at both sides at the same time

A wide plait, having lighter coil springs, was bordered by two narrower plaits, each having stronger springs. This gave firmer support to the shoulders of the passengers and provided for a form-fitting center section conforming to the natural shape of the back. (See Fig. 1.) This arrangement proved to be unusually comfortable, and was reminiscent of the ingenuity of Napoleon's coachmaker who built the upholstery of the Emperor's carriage to conform to the shape of that diminutive monarch's back.

Indirect lighting offered a novelty. The illustration on page 944 shows schematically how one designer concealed the lamp by placing it behind the arch of a specially constructed niche. A soft, pleasant light, flooding the interior of the car, is effectively produced.

This idea was carried out by some coachbuilders who built toilet cases in recesses behind little doors. As the doors opened, the interior of the pocket was lighted up by a lamp, concealed above the line of vision, as shown on page 945.

Adjustable seats are becoming more prevalent. This development was extended at times to the rear seat. Waterhouse showed a close-coupled body where the seat beside the driver shifted or rolled; when shifted toward the rear made room comfortably for two and when shifted to the former position became again a single seat.

Doors, in some cases, were made to be locked from inside.

Tops of convertible bodies folded low when down, and several were designed to disappear altogether. Vee windshields were quite general this year than before and the angle of tilt has more of the sport appearance on some of the closed bodies. Windows are probably a little less in height this year, probably coincident with more windows that are of angular or slanting design both front and rear.

It has been found to be practical to support a short, angular-sided window by extending the supporting legs well down into the doors. Ample room is available for security in this design. The glass is always steady and needs no rollers or other device to keep it firm.

The Ambi-Budd body on a Chrysler chassis showed a single unit of the front fender, the runboard and the rear fender, with the front end of the fender inclosing the forward end of the chassis member by a box formation. At the rear, the trunk formed a complete cover for any irregular parts of the underframing. There was a tendency to hide the chassis frame at the front and rear on some of the other cars, but the complete enclosing of the chassis front end by the fender was accomplished on this job. This feature of the Budd fender is illustrated and the complete car shown in our Nov. 28 issue.

Graham "Blue Streak"

(Continued from page 942)

cutouts in the trim panel backing. The projecting part looks like a small pair of pliers with slightly overlapping jaws. This is pushed into a drilled hole in the surface to which the panel is to be attached. The jaws, being under tension, expand against the side of the drilled hole, holding the panel in place. To remove the panel, all that is necessary is to place a screw driver back of it and pull the spring clips out. These trim panels are provided on the doors and on the rear side of a false interior windshield header box, which serves both as concealment for the windshield wiper mechanism and as a mounting for the interior sun visors.

Windshields are of the swinging type, with two concealed hinges and with the upper edge further protected against leakage by a shallow drip molding. This molding also serves to break up slightly the curve at the front of the roof. The windshield wiper shafts are not passed through the windshield frame, but extend through the top header bar behind the drip molding, as a further protection against leakage. Two top cowl ventilators are provided. Front seats are adjustable. All doors can be locked from the inside, although it is not possible to lock the right-hand front door from the outside without use of the key.

There are conventional type louvers in the hood. They are sloping, however, and thus impart a new line, harmonizing with the sloping radiator and windshield. A central combined hood-lift and locking handle is used. Radiators are braced to the body in a more effective manner than formerly. In the very interesting new front fenders, drumming of the side panels is prevented by a fender brace which extends out to this surface from the frame.

Following is a list of body types with prices:

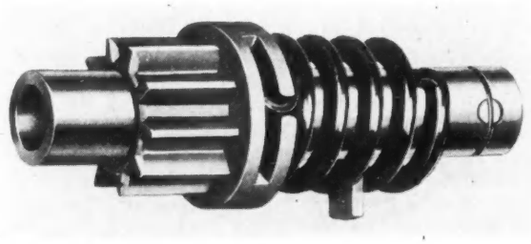
	Std. Types	De Luxe Types
2-pass. bus. coupe	$995	$1,070
2-4-pass. coupe	1,045	1,120
Convertible coupe	none	1,170
Four-door sedan	1,045	1,120

De luxe equipment includes pillow-type upholstery, cigar lighter, detail interior body refinements, and four white side-wall tires. Fender-mounted wheels and trunk rack are extra in both groups.

Safety glass is available all around at $25 extra on sedan, $17.50 on other models.

For the present production will be confined to sedan types. Other types will probably go into production in January or February.

New Starter Drive Built to Overcome Locking of Pinion Teeth and Ring Gear



Charter drive assembled

WE show herewith two photographs of a new starter drive due to James A. Charter, a well-known engineer, which is being manufactured by Charter Drive, Inc., of Chicago.

Referring to the illustrations, on the driving end of the starter shaft is mounted a hollow mandrel which is secured to the shaft against both angular and axial movement by a key and a pin. Near its outer end (away from the starter) this mandrel carries a radial arm referred to as a tracker. Directly in line with the hollow mandrel is a sleeve which is free on the starter shaft and which carries the starter pinion free upon it. To one end of the starter pinion is secured a cylindrical collar of somewhat larger diameter than the outside diameter of the pinion. This collar has a slot on one side into which engages the looped end of a helical spring made of flat steel ribbon, and on the opposite side it has a laterally extending arm called a stop log. This arm serves a double purpose. It has an inward projection a short distance from the outer face of the collar, which extends into the space between adjacent convolutions of the coiled spring and prevents the latter from cocking, while the outer end of the arm serves as a stop for the tracker on the hollow mandrel.

Assuming the starter to be at rest, the pinion is out of engagement with the ring gear on the flywheel; and the tracker, which, of course, is rigid with the armature shaft of the starter, is up against the stop log, which is rigid with the starter pinion. If current is now applied to the starter, the armature of the latter will start to revolve at great speed, and the tracker will move away from the stop, through the convolutions of the spring. The pinion does not take part in this rotary motion, as it is free from the armature shaft so far as angular motion is concerned, but the movement of the tracker through the coil moves the pinion in an axial direction into engagement with the ring gear.

This motion continues until the tracker reaches the end of the coiled spring, where it engages into the looped end of that spring. Immediately this occurs the spring is subjected to torsion, and a constantly increasing starting torque is exerted on the engine flywheel. We are informed that in case of a very stiff engine the coiled spring may wind up until its coils are supported all around on the sleeve, and that because of this support the spring cannot break.

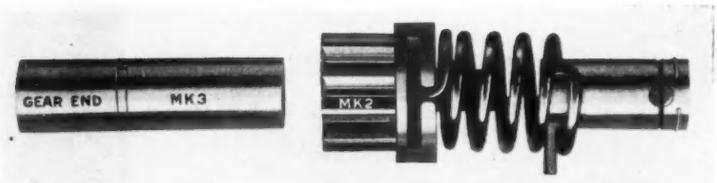
After the engine has been started, it overruns the starter, and as a result the tracker moves through the coils of the starter spring in the reverse direction, thereby withdrawing the pinion from the ring gear. The tracker finally ends up against the stop log of the pinion, where it remains while the starter is not being used.

An advantage claimed for this starter is that with it there is no possibility of the teeth of the pinion and ring gear locking. If when pinion and ring gear first come into contact a pinion tooth should come centrally against a ring-gear tooth, so that the pinion could not enter, the tracker would continue to move through the convolutions of the coiled spring, thereby producing both an endwise pressure and a torque. In fact, the tracker then drags the pinion around and enables its teeth to mesh with those of the ring gear.

Both sides of the pinion teeth are chamfered in the same way, and the same drive can be used for both right and left-hand starters, except that different springs are required.

When out of use, the pinion is prevented from jarring into engagement with the ring gear on the flywheel by a circular spring ring on the forward end of the hollow mandrel.

In the illustration to the right are shown the parts of the drive, viz., from left to right, the pinion sleeve, pinion, spring and hollow mandrel



More Diesel-Engined Chassis Appear

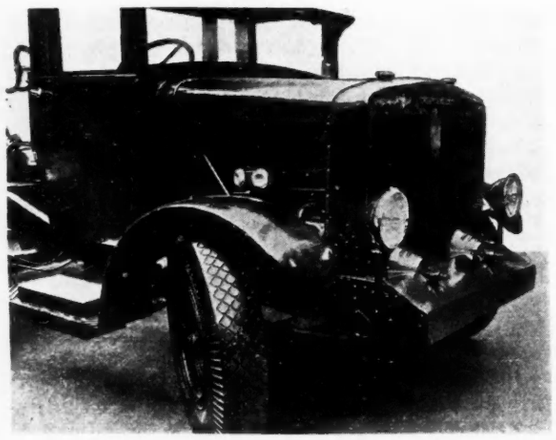
Willeme exhibits vehicle with pay-load capacity of 35 tons. Tatra introduces independent springing on 10-ton unit with central tubular chassis member

DIESEL engines, big capacity trucks and six-wheelers constituted the outstanding technical features of the Paris truck show which opened in the Grand Palais Nov. 28. The makers showing trucks equipped with Diesel engines were Saurer, Renault, Berliet, Somua, Unic, Tracta, Panhard & Levassor, Delahaye, Willeme, Laffly, Lavigne and Bernard. In addition, Saemi and Société Lilloise des Moteurs showed Diesel engines not mounted in chassis.

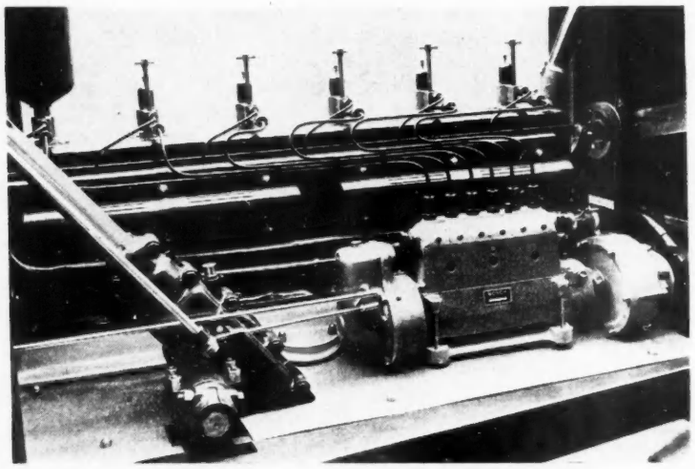
Saurer is now producing three Diesel models, one with six cylinders and two with four cylinders; Renault and Berliet each have two models, with four and six cylinders. The Berliet makes use of the Acro-Bosch system, with an air chamber in the piston head. Unic has taken up the Mercedes-Benz license and is producing a six-cylinder model mounted in both a six-wheel and a four-wheel chassis. The Somua six-cylinder is built under Deutz license. Panhard & Levassor have produced two sleeve-valve engines on the Diesel principle, one having four and the other six cylinders. Tatra and Delahaye each have six-cylinder models of the overhead-valve pushrod type. There is a general similarity of design in all these engines, which in practically all cases have six cylinders of 4½ to 5 in. bore, valves in the head, pushrod operation and the Bosch fuel pump.

The Société Lilloise des Moteurs, which is a branch of the Peugeot Company, has added a three-cylinder model to its single and two-cylinder types already on the market. Built under Junkers license, these engines work on the two-stroke principle and have opposed pistons. The three-cylinder has a bore of 85 mm. and combined piston stroke of 240 mm. The upper piston, which also forms an air pump, has a stroke of 96 mm., while the lower piston, which uncovers the exhaust ports, has a stroke of 144 mm. Dry sump lubrication is used. Power output is 80 hp. at 1500 r.p.m., and weight without flywheel 1000 lb. Société Lilloise engines are fitted on Laffly, Willeme, Lavigne and Bernard trucks. The smallest Diesel in the show is a Lavigne one-tonner with a single-cylinder two-stroke Société Lilloise engine.

The heaviest vehicle in the show is a Willeme of 14 tons dead weight and a useful load capacity of 35 tons. It is a six wheel tractor with one live axle driven by overhead worm, and a semi-trailer having two divided axles, thus allowing four wheels to be spaced equally across the vehicle, instead of employing them as duals at each end of a full width axle. This system of trailer wheel mounting was introduced by Lagache & Glaszmann a year ago and since then has had a numerous following. The Willeme tractor and trailer are powered by a three-cylinder



Chenard-Walcker 22-ton tractor with two engines side by side



Panhard & Levassor sleeve-valve Diesel engine

at Paris Commercial Vehicle Show

by W. F. Bradley

Diesel engine. As the tractor has dual tires on the two rear axles, the total number of tires is 18. This vehicle is intended for hauling building material in Morocco. Special bridges will have to be built to accommodate it.

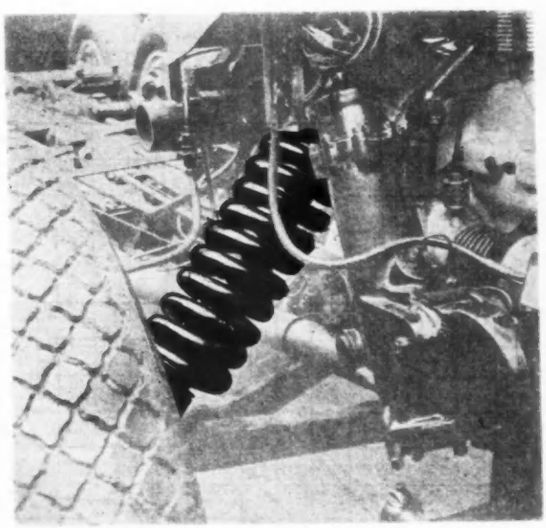
Chenard & Walcker present a two-engine tractor capable of hauling a useful load of 22 tons at 22 m.p.h. average, with a maximum speed on the level of 37 m.p.h. The tractor has two sleeve-valve engines, each of 457 cu. in. mounted side by side in a frame, with transmission and drive shaft for each. The clutches are operated simultaneously through a servo mechanism. There is a single change speed lever, but the five-speed transmissions are connected up by a cross shaft with ball and socket joints, so that speeds are changed in the two transmissions simultaneously. The tractor is on pneumatic tires and hauls pneumatic tired trailers with split axles allowing the wheels to be spaced at equal distances across the vehicle.

Saurer has a 14-ton six-wheeler with a six-cylinder Diesel engine of 110 by 150 mm. bore and stroke. The feature of the vehicle is the method of driving the four rear wheels. The propeller shaft drives the usual transverse differential shafts through spiral bevel gearing. At each end of the transverse differential shafts there is a spiral bevel gear and differential driving an enclosed shaft parallel with the main propeller shaft, and at each end of these fore and aft shafts a spiral bevel gear driving a road wheel. There are thus three differentials: one on the transverse shaft and one on each of the two fore and aft shafts. The pair of rear semi-elliptic springs have a length of 112 in., with five leaves nearly one inch thick. An eye is rolled at each end of the main leaf and silentbloc bushings are used in split housing. Tire size is 42 by 9 all round.

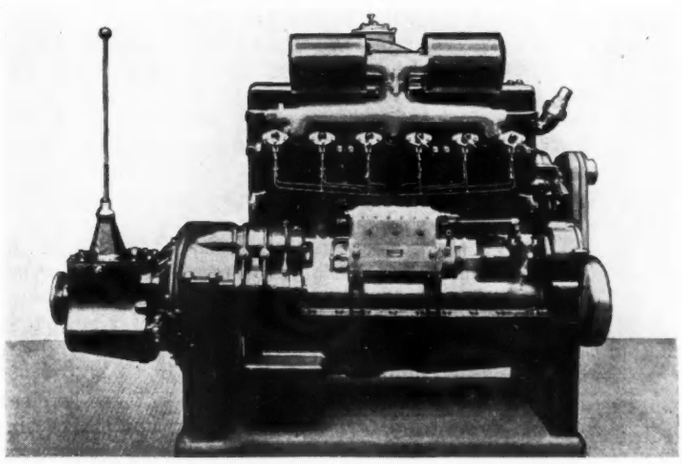
Tatra has a 10-ton six wheeler fitted with a six-cylinder gasoline engine, but capable of taking the firm's six cylinder Diesel. The truck is distinctive in having a central tubular chassis member, with independent springing for all six wheels. Coil springs are used at the front and inverted semi-elliptics at the rear.

Six cylinder engines are used more extensively for coach chassis, among the new models being Rochet-Schneider, Berliet, Delahaye and Renault. The only straight eight in the show is an American engine used on the Bernard high-speed truck. Both for freight and passenger service the tendency is towards higher speed, many of the heavy vehicles being announced as having a road speed of from 50 to 55 m.p.h.

This show is almost entirely French, the only foreign makers being Tatra from Czecho-Slovakia, with Ford, Dodge and Pierce-Arrow representing the American industry.



Front suspension by coiled springs on Tatra truck



Delahaye six-cylinder Diesel engine

Synthetic Resins Cut Finishing Time, Protect

Unique film-forming properties claimed for new surface which can be introduced into present body operations with reduction in the baking interval

WITH the completion of a long period of scientific research in the field of automobile-body and sheet-metal finishes, produced with synthetic-resin bases, and a large-scale production experience extending over about three years, the first phase in the development and utilization of these new finishes, appears to be auspiciously launched. Some of the most important figures in the paint and chemical industry have been identified with this work, of which very little has been said publicly until the experiment proved itself, at least to their satisfaction.

Other factors, too, made it desirable for the various principals to proceed very cautiously. Among other things are such matters as the problems involved in the control of the synthetic resins; chemical problems involved in the manufacture of finishes utilizing these; production problems in the automotive plants, and a rather involved patent situation. By common consent the patent situation was cleared up early this year in accordance with the following statement which was published in the trade press: "For several years the paint, varnish, lacquer and enamel industries have shown great interest in the phthalate and similar synthetic resins of the polybasic acid type, variously designated as Alkyds, Glyptals and Rezyls. Development of these resins and their uses has been retarded, however, because of the patent situation. Each of the three groups which have been responsible for the development of these resins and are actively engaged in research in this field, namely, General Electric Co., du Pont Co. and American Cyanamid Co., have been faced with the possibility that resins and products from resins which they have developed and placed on the market might come under patent control of one of the other groups as a result of some patent obtained upon an application now pending in the U. S. Patent Office. There are a large number of these applications, besides a considerable number of issued patents controlled by the three groups. The patents and pending patent applications cover both the resins and their uses, and are not limited to the field of coating compositions.

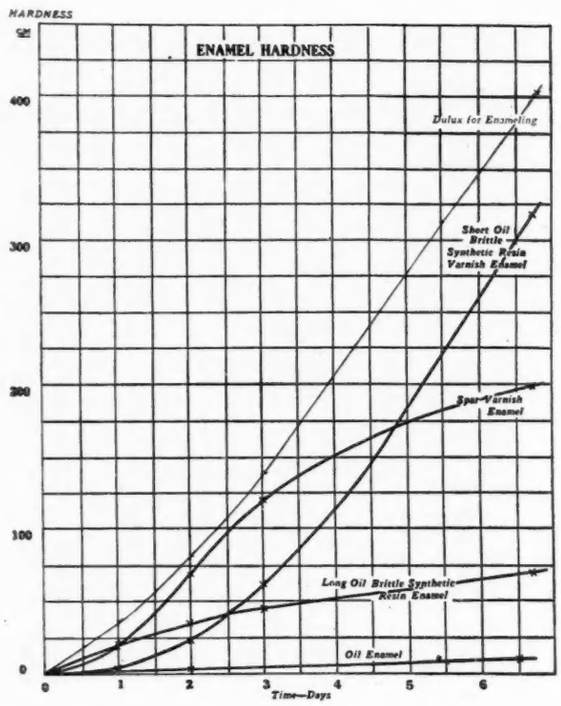


Fig. 1—The hardness of Dulux for enameling is illustrated by these hardness determinations made on a Pfund tester

This instrument is a modified Brinell hardness tester and indicates hardness by measuring the weight necessary in grams to drive a quartz rod a definite distance into the film

"It is now announced that the restraint upon the development of these synthetic resins on account of patents has been removed by a series of agreements. The parties to these agreements are General Electric Co. and its controlled companies, E. I. du Pont de Nemours & Co. and its controlled companies, American Cyanamid Co. and its controlled companies (including the Rezyl Corp.) and the Ellis-Foster Co. which, together with Rezyl Corp., controls the inventions of Carleton Ellis in this field. The purpose of these agreements is to make it possible for each group to pursue its technical and commercial development in this resin field with the assurance of immunity against prosecution of itself or its customers under patents that are at present owned or may shortly be obtained by the other groups."

Through the cooperation of those interested in the manufacture of synthetic resin products, we propose to discuss the whys and wherefores of synthetic resins, and in the latter part of the article, to describe briefly the outstanding characteristics of some of the products now available commercially.

To the users of automotive metal finishes a clear answer to each of the following questions is of immediate importance. Moreover, it will probably clarify

Longer

by
Joseph Geschelin

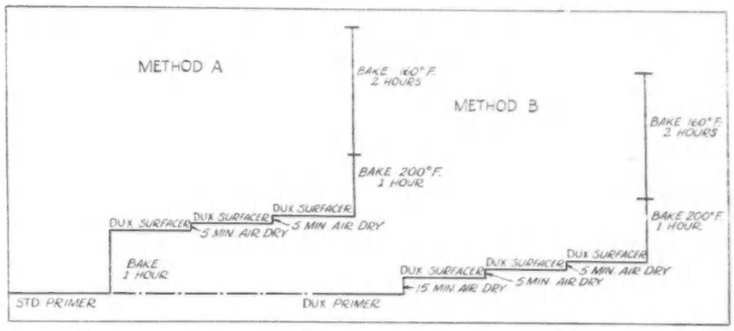


Fig. 3—Time process charts showing two methods of finishing, one with a standard primer and the other with Dux primer

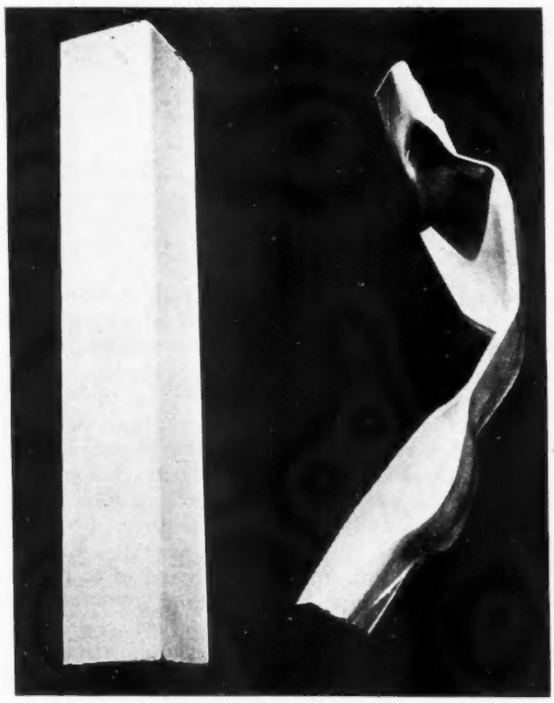


Fig. 2—This view shows a steel tube finished with Dulux white and a similar tube bent and hammered

much of the mystery surrounding this vital development.

1. What is a synthetic resin?
2. Why have synthetic resins?
3. What specific finishes are produced?
4. What are the comparative advantages of these products.

Two factors contribute to the quality of any finishing material, such as paint or enamel. These are:

1. The pigment; which imparts color, build, weight, and hiding power.
2. The vehicle; which holds this pigment in place, and provides a continuous adherent film.

Scientific tests show that of the two, the vehicle is the first to disintegrate. Perhaps the best reason for this is that since so much emphasis was always placed on pigments, they are now well understood, and almost perfectly controlled. Accordingly, the attention of paint technologists lately has been directed to the development of better vehicles. And since the possibilities of natural oils, gums and resins have been pretty well exhausted, it is only natural that substitutes for these should be explored. The result is a synthetic product chemically controlled so as to produce certain desirable qualities to the exclusion of all others which might occur in a natural product. Synthetic resin, as will be explained later, appears to answer many requirements due to a unique film-forming property.

Today the market affords two chemically different families of synthetic resins. One is technically known as alkyd complexes. This is characteristic of products made by du Pont, General Electric, American Cyanamid and others. The other type is a series of phenolic condensation resins, of which those made by Bakelite Corp. with physical characteristics shown in Table 1 are examples.

Without going into the complexities of the chemistry of synthetic resin—and we can assure you that there are plenty of complexities—we may say that alkyd resins (as they may be called technically) are formed by the inter-reaction of polyhydric alcohols and polybasic acids. Early experiments showed that the simplest reactions are those between glycerine and phthalic anhydride. The simplest form of synthetic alkyd resin or its modifications is therefore a form of diglyceryl-triphthalate ($C_{30}H_{24}O_{12}$). Although the chemical reactions are exceedingly complex and not yet clearly understood, it is known that all of these chemical bodies, upon application of heat, polymerize to an insoluble, infusible gel or film.*

It is important to realize that although there is an infinite variety of these chemical complexes, only a few have any practical value. The chief object of research, therefore, has been to isolate the useful types, catalog their characteristics, and learn how to use each according to the demands of service. The range of finishes produced with the synthetic resins and available commercially today is about as follows:

1. Lacquers of the nitrocellulose type.
2. Varnishes.
3. Condensation finishes of the air-dry and low-bake

*"Alkyd Resins as Film-Forming Materials," by R. H. Kienle and C. S. Ferguson, Industrial and Engineering Chemistry, April, 1929.

type. This includes substitutes for paints, varnishes enamels, lacquers and surfacers.

Many advantages from the point of view of quality and overall production cost are claimed by the manufacturers of these finishes. These claims are based on scientific tests and the results of extensive production tests in various automotive plants and include:

1. Longer protection—failure by chalking rather than cracking, although the period before chalking sets in is much longer than usual.
2. Because the finish does not fail through brittleness it is much easier to refinsh in service.
3. Longer retention and color and gloss.
4. Better resistance to atmospheric aging conditions.
5. A harder protective film with better adhesion to the metal.

What about production costs? It is claimed that:

1. These materials can be prepared for spraying or brushing, thus making them available for low volume production.
2. These materials have air-drying, low-bake characteristics.
3. Fewer baking operations are necessary.
4. Less floor space and oven equipment are required.
5. Less power in the form of heat is needed.
6. A relatively smaller amount of material is required.

It seems wise to emphasize that great caution is necessary in the selection of the product best suited for individual requirements. And the logical answer, as it is in many other analogous problems, is to select reliable sources of supply, and get their technical assistance in prescribing the materials best suited.

With these fundamentals in mind, it is instructive to study the claims and characteristics of some of the finishes now on the market. It is our understanding that the materials included in this study already have been tested by some of the outstanding manufacturers in the automotive industry.

One prominent line of finishes, for example, is du Pont Dulux, made by E. I. du Pont de Nemours & Co. For the present it is recommended for the following applications in the automotive field:

1. On wheels of high-grade commercial vehicles.
2. As an overall finish on certain grades of commercial vehicles.
3. As a wheel finish, particularly wire wheels.
4. As an overall finish on cheaper grades of used cars, or wherever the labor of rubbing and polishing is prohibitive.
5. On the inside of commercial bodies.
6. As an enamel finish for fenders and similar metal parts.

Dulux belongs to the group of modified glyceryl phthalate resins, and is produced in two types. One is based on an oil-like vehicle and is designed for painting purposes; the other is based on a tough, rubbery gum vehicle and is designed for enameling. In production it may be sprayed or brushed.

Much valuable information concerning the properties of Dulux, and laboratory tests establishing these, is found in the report by the du Pont research staff, from which the following high spots are taken: It is claimed that the finish is firmly adhering and flexible and that it ultimately fails by chalking. Chalking, however, is resisted to an unusual degree. Enamels produced by the Dulux gum vehicle are said to possess a deep luster, unusual hardness and resistance to scratch, and quick-drying characteristics.

Fig. 1 shows the results of some comparative hardness tests.

The character of adherence and flexibility of the film is best illustrated in Fig. 2, which shows the result of a tubing test; although the tube is crushed, the enamel adheres tenaciously and remains unbroken at all points.

One of the tests established an unusual degree of freedom from attack of oil, gasoline, and alcohol. The resistance to heat may be gaged from the statement that samples have withstood temperatures ranging from 200 to 350 deg. Fahr. for long periods of time and still remained tough and adherent. Dulux for enameling dries dust-free in approximately 20 minutes. Articles may be recoated within an hour if the application is by spray. The film is tack-free in approximately four to five hours and absolutely hard in 10 to 12 hours.

Another du Pont product based on synthetic resin is a series of undercoatings marketed under the trade name "Dux" undercoat. They are supplied in liquid

TABLE I

Physical Characteristics of Bakelite Synthetic Resins

Bakelite Synthetic Resin	Form	Melting Point (1)	Color Acid (2)	Number (3)
Class I				
XR-254	Hard, Resin-like	225° F.	1—3	90
XR-820	Hard, Resin-like	225° F.	4—7	90
XR-821	Hard, Resin-like	225° F.	7+	90
Class II				
XR-302	Viscous Liquid		4—7	30
XR-687	Viscous Liquid		7+	25
Class III				
XR-595	Hard, Resin-like	210° F.	2—4	12
XR-492	Hard, Resin-like	230° F.	3—6	18
XR-352	Hard, Resin-like	215° F.	4—7	40
XR-564	Hard, Resin-like	250° F.	4—7	40

(1) Melting points determined by a modification of the ball and ring method recommended by the A.S.T.M., which has been found especially suitable for this type of material. Full details of the apparatus and method will be supplied upon request. For comparison, the melting point of W. W. Rosin by this method is 174° F. and the melting point of a low acid number ester gum is 185° F.

(2) Color determined by dissolving synthetic resin in an equal weight of toluol and comparing with Gardner-Holdt color standards.

(3) Acid numbers determined as follows:
Weigh approximately 1 gm. of the material and transfer to a 250 cc. Erlenmeyer flask. Add 50 cc. of a neutral solvent consisting of 90 parts xylol and 10 parts butanol for Class I Bakelite Synthetic Resins or 75 parts 90° benzol and 25 parts alcohol for Class II and Class III Bakelite Synthetic Resins. Care should be taken to have the solvent mixture neutral. Heat gently to solution. Cool to room temperature, add 4 drops phenolphthalein and titrate to a faint permanent pink with tenth-normal alcoholic sodium hydroxide.

$$\frac{\text{cc. caustic} \times \text{normality} \times 56}{\text{Wt. sample}} = \text{Acid number}$$

form, pigmented as desired, and outwardly are similar to any other undercoating of the usual oil-base type. Moreover, they lend themselves to the same methods of handling and practice as is current in body shops. As adopted by a number of prominent manufacturers, one of two methods is commonly employed in large-volume production.

Method A, Fig. 3, continues the use of the regular oil primer with a subsequent bake. Thereafter Dux surfacer is used with a five-minute air-drying interval between operations. When the last coat of surfacer has been sprayed on, it is baked either at 200 deg. Fahr. for one hour, or at 160 deg. Fahr. for two hours. The succeeding operations are the same as usual.

Method B employs Dux primer and surfacer throughout, thus taking full advantage of the air-drying cycle made available by this process. After the primer has been sprayed on, it is air-dried for 15 minutes. Then each surface spray is air-dried for five minutes as in Method A. The last surfacing coat is baked at 200 deg. Fahr. for two hours. Because of the rapidity of operations attending this process, the prepared metal surface must be unusually clean, in fact, it must be as close to chemically clean as possible, to insure the best results.

Early in November, 1931, the Jones-Dabney Company announced that Syntex, their new body finish, had been approved by three automobile builders. Syntex is a synthetic resin finish of lacquer type. It is handled in exactly the same manner as present lacquers until it reaches the two final operations, namely, mistcoat and polishing. Neither of these operations is required with the Syntex system. Instead, the work passes directly into an oven and is baked about 40 minutes at approximately 225 deg. Fahr.

The Syntex System

The Syntex system is designed to be applied right over the present type of primers and surfacers. After the automobile body or fenders have received the priming and surfacing operations, they are ready for the application of three to five single coats of Syntex, depending upon the quality of work desired. Syntex is then allowed to air-dry at room temperature for approximately 1 to 1½ hours or is force-dried for 45 minutes to an hour at a temperature of approximately 125 deg. Fahr., after which it is sanded with No. 320 or No. 400 wet or dry sandpaper, using as a lubricant water with a small percentage of soap. The purpose of the sanding operation is to remove spray dust and spray laps, which are unavoidable in spraying paints around corners, moldings and sharp contours. Moreover, sanding removes the dust, nibs and dirt which always settle upon painted surfaces before the paint has an opportunity to set.

The work is then baked for some 40 minutes at a temperature of 200 to 225 deg. Fahr. This last baking operation takes the place of polishing. Due to the chemical properties of Syntex, it softens during the baking process sufficiently to allow sandpaper scratches and other imperfections in the surface to level out and flow together, leaving a glass-like film over the entire job with a deep, brilliant lustre. The final finished coat of Syntex is said to be a hard, tough, extremely elastic film that retains its brilliance indefinitely.

Bakelite synthetic resin and the Rezyls made by the American Cyanamid Co., which will be described in the following paragraphs, are not sold directly to the users. As a matter of fact, these materials are designed to serve as the primary ingredients in finishes manufactured by paint and varnish makers. The user is interested in the properties of these materials, inasmuch as they affect the products which he buys from other sources. The user's interest in this case is analogous to the desirability of knowing the composition of purchased cutting tools and the chemical and physical properties of a drop forging.

The American Cyanamid Co. supplies to the finish-manufacturing trade a series of synthetic resins called Rezyls. Chemically these are modified glyceryl phthalate resins. They range from hard solids to viscous liquids, the former being called Rezyls and the latter Rezyl balsams. For simplicity these products are classified in three groups. The Rezyls in Group 1 are characterized by complete miscibility with nitro-cellulose and are used to replace resins and other ingredients formerly used. The Rezyls in Group 2 are the newer type, designed for air-drying and low-bake type finishes and are not dependent on admixture with nitrocellulose. The resins in Group 3, commercially known as teglacs, have physical properties somewhat similar to natural resin. They lack the toughness of the rezyls described and cannot be used alone for durable coating. They were developed originally as an improvement over the natural and synthetic resins previously used in lacquers.

It is claimed that tests by natural exposure, and accelerated weathering with ultra-violet light have demonstrated great durability. For example, tests in mercury vapor, ultra-violet light machines, show failure of ordinary clear lacquer from 250 to 300 ultra-violet light hours, and failure of spar and four-hour varnishes in 700 hours. Under these conditions many clear rezyl lacquers did not fail under 2000 ultra-violet light hours. Some scientific tests substantiating these tests for durability and opacity are found in an article by Gamble and Stutz.*

The temperature usually selected for testing finishes is that to which lacquer coating may be subjected on the hood of an automobile in Texas sunlight. In testing resins they have used a temperature of 150 deg. Fahr., and tests have run continually for about seven days. The loss in weight, of the various resins, was determined and compared with tri-Cresyl phosphate, which is said to be notably superior to most plasticizers in this respect.

Rezyl 12	0.16%	loss
Rezyl 19	0.18%	"
Rezyl Balsam 33	0.16%	"
Rezyl Balsam 53	0.16%	"
Tri-Cresyl Phosphate	0.18%	"

Of the new-type synthetic resins in Group 2, Rezyls, Nos. 110, 113 and 1102, are recommended for use in primers, surfacers and finishing materials. In each formula the resulting finish after spraying should be baked for about an hour at a temperature of 180 to 200 deg. Fahr. The enamels will air-dry tack-free in practically 45 minutes. All finishes formulated with these resins will air-dry in from four to six hours to a hard and tough film.

The Bakelite Corporation has recently entered the field of automobile finishing materials with a series of Bakelite synthetic resins which may be characterized as phenolic condensation products. The physical char-

(*Turn to page 958, please*)

*"Ultra-Violet Light Transmission Characteristics of Some Synthetic Resins," by D. L. Gamble and F. G. A. Stutz. Industrial and Engineering Chemistry, April, 1929.

Big Jobs Open

as presidents, directors and high executives of industry

For Engineering Leadership

by Walter Fishleigh

THE door is wide for engineering leadership, and especially in motor car engineering.*

It is high time automotive engineers realized the great opportunities in engineering prior to and after the drafting board work and the blueprints.

It is time they began:

First, to realize their proper place in industry,

Second, to display a perspective and an ability which would justify them in that place, and

Third, to demand that place in industry.

As long as engineers wait for the sales department and the management and the public to do their engineering thinking for them, they need expect no jobs bigger than drafting or designing.

What engineer claims credit for this most recent engineering development—wherein we round off the upper corners of a body, put on a new shade of paint, hang a fly catcher in front of the radiator, and announce a new model.

Engineers as a class are too serious, too careful, too cautious—sometimes with disturbingly negative results.

Notoriously, automotive engineers have been expert and untiring copyists until one cannot tell the most expensive car from the cheapest except by examining the name plate or the wheelbase.

Body lines, fenders, radiators, hoods, louvers, headlamps, general chassis arrangement, brakes, free wheeling, fly screens—all have been so copied and photostated and recopied that we have in America today standardized design, standardized style, fashion and appearance from which designers, engineers and managements dare not depart.

Individualism, personality and character are lost in production standardization. But recently we reached an astounding situation; all models became so nearly alike that no one could copy from any other and get variation enough to make a new model.

So some wide-awake engineer conceived the idea of putting one over on the competition—just mounting two of each accessory on the car instead of one—and presto! new models and new advertising.

Two tail lights, two stop lights, two pairs of parking lights, two rear-vision mirrors, two vanity cases, two smoking sets, two non-interchangeable sets of keys, two horns.

And all this in the face of the most tremendous and inspiring opportunities for originality and craftsmanship and discriminative design which the world has ever offered to engineers and manufacturers.

As engineers we "know too many things which are not true." We try to reduce everything to third-decimal-place analyses, whereas the greatest and most important problems are not susceptible to such analysis nor to exact solution nor to unquestionable answer.

In engineering, as in all other of the world's activities, a problem capable of exact and unquestioned answer, is a mighty small problem.

But engineers continue to restrict engineering philosophy to mathematics and the slide rule.

There is sufficient individuality and courage and taste and art among American automobile owners to appreciate and buy models which vary from the standardized multitude, providing such variations are based upon sound fundamentals in mechanics and comfort and economy and beauty of line.

A complete departure from present types may add much in the way of distinction and comfort, and operating economy and the pride of ownership.

The trouble with these broad-gage engineering problems is that they cannot be quickly run down to a definite solution—there are no answers in the back of the book. But their very indefiniteness is their fascination; their very far-reaching importance is their inspiration; their fundamental radicalism is their charm.

What engineer, today, dares say that axles are desirable parts of automobiles either front or rear—just because they used to be (and still are) good for oxcarts and milk-wagons, or because we do not yet know the advantages of separately sprung wheels?

What engineer, or even sales manager, can say that the present chassis-body independence, with their extra weight, unnecessary parts, antagonistic design and unsympathetic designers, should not be discarded?

What engineer can watch the simple control performed by the little elevator girl—touch a button here—touch a button there—and not wonder at the complicated two-handed, two-legged grasshopper

*Excerpts from a paper by Mr. Fishleigh before the Philadelphia Section, S.A.E., Wednesday, Dec. 9.

Fishleigh Formula:

1/3 technical training
1/3 "applesauce"
1/3 "crust"

1 effective engineer.

College professor, draughtsman, designer, Army officer, chief engineer and keen observer of the foibles of men and industry, Walter Fishleigh finds that engineers have repeatedly evaded the call of opportunity.

"Engineers are content with being draughtsmen—they wait for the sales department and the public to do their engineering thinking for them," he says.

Notoriously, automotive engineers have been expert, untiring copyists.

A problem capable of exact and unquestioned answer is a mighty small problem.

Leadership demands that an engineer be technically trained, but more important, he must have tact—or "applesauce"—and courage of his convictions, or "crust."

Walter Fishleigh

gymnastics which that same little girl has to perform to move her automobile two blocks and around the corner through slow traffic?

Who says that much clearer vision in front is not desirable or not necessary?

What engineer can say that the present square ended, box-shaped, wind-resisting body should not be replaced by the charming and efficient lines of the airplane fuselage?

Who argues that the horsepower must be out in front, just because the carriage had the horse out in front and the automobile started out as a horseless carriage?

In short, is it not a fair question to ask: "Has not the automobile, which began as an uncertain, slow speed vehicle with chassis arrangement, body lines and complete overall ensemble suited thereto, now developed outstandingly into a high speed vehicle wherein the old chassis arrangement and body lines and even the complete ensemble are misfits and out of place?"

Does not high speed travel demand in automobiles mechanical arrangement and body shape and aerodynamic adaptability along the beautiful and efficient lines of the airplane as contrasted with those of the milk wagon?

In body, chassis and sales engineering there are now open the most important, the most far-reaching, the most inspiring opportunities for engineering leadership which the industry ever offered.

It's our job as engineers to keep the public thrilled by newer and better motor cars. And the opportunities are as thrilling as the need is great.

It doesn't take engineering leadership to see that there is something rotten in an industrial system wherein a few capitalists are able to summon ten thousand loyal, hard-working, family-loving workers from their homes, line them up in a lock-step organization upon the following astounding, yet universal basis:

(1) When times are good, you will get a regular wage, the executives will draw big salaries, and the *plus* results of the whole team work will go as profits to the capitalists and executives in the way of dividends or bonuses or both.

(2) When times are slow, your wage will be discontinued, the executives will still draw their big salaries, the capitalists will still draw their dividends, but you, by being laid off, will now receive the *minus* results of the whole team work in the form of losses.

In other words, when the results of the whole team's efforts are—or profits, the *capitalists* get them; when the results of the whole team's efforts are—or losses, *you* get them.

(I know something whereof I speak, for over a considerable period of years, I was associated in an organization in which this policy "got by" notoriously.)

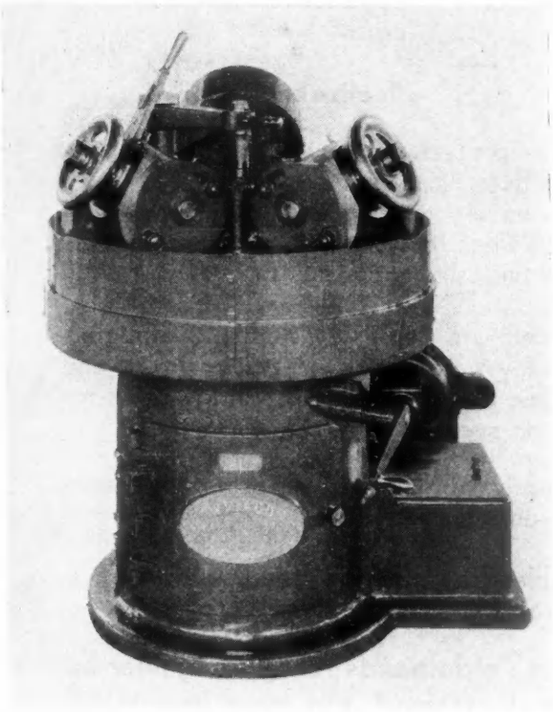
Do not say that these problems are any more "legal" or "political" or "business" than they are engineering.

Do not say that they are too big, or too broad or too inspiring for the engineer to tackle.

Do not declare a moratorium on engineering action and engineering opportunity and accomplishment.

Gear-Burnishing Method Adapted to Wicaco Production Machine

Output of 72 carburized pieces per hour, or 120 in the soft state, got without the use of oil



Wicaco gear burnisher has adjustable pressure on head at left

EARLY in 1930, a new method of burnishing bevel gear pinions was described exclusively in *Automotive Industries**. In this process, a soft or carburized pinion, straight or spiral bevel, is burnished by running in with three master gears. The pinion is constrained to a definite relation with its apex point but is otherwise free to move and find its own natural operating position between the master gears.

This process is essentially an inspection operation. It will materially improve correctly generated pinions and increase the amount of rolling action between gears and pinions.

According to a recent announcement, this machine with important improvements and refinements, has been placed on the market by the Wicaco Machine Corp., Philadelphia. It is offered to automotive manufacturers as a solution to production problems in quality gear manufacture which have been quite acute up to the present time. With this machine, the time required to burnish a carburized pinion is about 15 seconds per side. Production per hour is about 72 pieces. In the soft state, the output per hour is approximately 120 pieces.

The machine as illustrated has many vital changes. To adapt it to high production, each master gear head is now mounted on a sort of dividing head arrangement which permits a ready adjustment angularly as well as in the three principal directions.

Perhaps the biggest improvement is in the provision of an adjustable pressure for the head at the left. Pressure may be varied by means of the hand lever shown.

The machine is supplied with a pressure feed lubrication system so arranged that the lubricant can be directed right to the pinion. A mixture of red lead, soda and water is used for burnishing. No oil of any kind should be used during the burnishing process. While oil reduces the burnishing time very materially, it is not recommended because of its harsh cutting action which results in a poor surface. An agitator, connected with the countershaft at the base of the machine, prevents the red lead from settling in the tank.

In order to obtain a satisfactory finish on the tooth profile, the speed of the machine should not exceed 225 r.p.m. and should be decreased as the size and general circumference of the gear in process increases.

The machine is rigidly built and weighs 3340 lb. The reason for this is to overcome vibration resulting during the burnishing operation.

The base is adaptable for either motor or belt drives and a change-over from one to the other can readily be made. For motor-driven units a five-horsepower reversible motor is recommended.

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* "Three Master Gears Employed For Burnishing Pinions," by Chas. H. Logue and Conrad O. Hersam. *Automotive Industries*, May 10, 1930.

Photo Courtesy of C. O. Bartlett & Snow Co.

PRODUCTION LINES

Check

We are reminded that one answer to a query in Production Lines, Nov. 28, 1931, is found in a recent article. We said in "P.L." that—"two courses of development (in nitriding) are now being explored by technicians. One is the search for a shorter heating cycle. The other is concerned with the ability to nitride steels other than nitriding steels." * * * The article is—"Continuous nitriding process will produce any degree of penetration or hardness by varying the heat cycle," by R. J. Cowan, *Automotive Industries*, Aug. 29, 1931. The pertinent statement in this article is that—"work done in 16 hr. with this process compares favorably with that done in 48 hr. by usual methods." Check!

Good Shapes

Looks as if there is more in the gear shaper than we have realized. At least as demonstrated by Fellows. Shaping gears is just a routine job although they are now shaping helicals and worms. The biggest field lies in shaping things like cams, rotor parts, blower parts, and in fact all kinds of odd-shaped work. You can find a lot of new uses for your shaper.

Other Things Count

This was voiced at the materials-handling session at the last annual meeting of the A.S.M.E. Why do we stress the labor-saving feature exclusively when talking about materials handling equipment? In many cases the objective is altogether different. For example, a conveyor for heat treating or baking ovens decidedly controls quality. No other method will do as well. Similarly, conveyors are useful in controlling a process. These things do not contribute to technological unemployment.

Throughout the Shop

Expanded metal is a process of making a continuous fabric of uniformly shaped diamond meshes like a wire screen in appearance. According to a recent note, the U.S. Gypsum Co., of Chicago, has acquired the manufacturing rights and brands for this product. It is offered to industry under the trade name, "Red Top Expanded Metal." Applications are: for machinery guards, bins and partitions, window and door guards, etc.

Worth Considering

Certain special machine tools used in building Citroen cars are made in their own plant. We ask why? The answer is that they were unable to buy special equipment in Europe. They felt too that special tools would be too expensive if ordered in this country. How about it, machine tool builders? Can't we match their fabrication costs? Incidentally, Citroen uses unit machines readily convertible in case of model changes.

Speaking of Grades

According to a man who has just spent considerable time in Germany, they know a lot about tungsten-carbide over there. One big reason for this is that they use a lot of it. Out of this has come the development of different grades of T-C to suit the nature of the operation. For example, there is one grade for boring, another for general routine work, and still others for special applications. Manufacturers here are prepared to specify suitable grades for your work. You may be startled at the results of checking over your present T-C tooling with this idea in mind.

T-C Comments

When an issue of T-C comments from the pen of Frank Curtis of Kearney & Trecker comes out, it's usually full of worth-while information. No. 25 which reached us recently deals with vibration. It's a fine job of applying fundamentals to machine shop practice. One law in mechanics is—amplitude of vibration increases as the cube of the overhang. How does this apply to tools and machines? Liberally translated it means that overhang must be held to a minimum if vibration is a factor. In using tungsten-carbide tools, rigidity is of prime importance. They must be supported as close to the point of application as possible, because these tools can't stand deflection.

In Off Times

This one may be old. But it's good just the same. Going through a plant the other day we noticed that although everything else was shut down, conveyor lines were running. Upon investigating found that at one end an air blast was rigged up. As the conveyors passed through this, all muck, old oil, grease, and what not was blown off. That's preventive maintenance.—J. G.

MANUFACTURING MANAGEMENT METALLURGY

Synthetic Resins Cut Finishing Time

(Continued from page 953)

acteristics of the three classes of Bakelite synthetic resins will be found in Table 1.

The resins in Class 1 are designed for use in varnishes, lacquers and paint and are directly soluble in drying oils. This class may be termed oil-reactive to differentiate it from other resins which are merely oil soluble or primarily heat reactive. The resins in Class 2 possess many of the properties of those in Class 1, but in addition have other properties which permit their use as vehicles for coating materials. They are also compatible with nitro-cellulose formulae, in which they serve the double purpose of resin and plasticizer. The resins in Class 3 are all soluble in drying oils, and most of them are compatible with nitro-cellulose. The materials in this class do not possess the same wide range of usefulness as those in Class 1 or Class 2. The resins in Class 2 are of particular interest to automotive manufacturers, as they form the basis for rapid-drying varnishes, baking enamels, dipping enamels and brushing lacquer.

The specific properties which the Bakelite resin is said to incorporate into protective coatings are—quick-drying, durability, hardness and toughness, and a new order of moisture-proofness and resistance to soap and chemical solutions, such as dilute alkalies, dilute acids and salt. Thus its initial entrance into the automotive field has been in anti-corrosive baking fender enamels, wire wheel enamels, clear and pigmented wooden wheel coatings, in adhesive and anti-corrosive primers and in waterproof surfacers as undercoats for the lacquers. High moisture-proofness and resistance to bacterial action is said to make the Bakelite varnish an ideal material for the protection of the interior of wooden bodies, especially in warm, humid climates where fungus growth has become a problem.

It is well known to those familiar with the development of synthetic resins that many paint and varnish manufacturers, among whom are the Ditzler Color Co., the Mountain Varnish & Color Works, Inc., and others, have produced one or more branded finishes based on synthetic resins. Generally, however, the identity of the ingredient has been concealed, although the special properties of the finish have been stressed. Evidently the reason why so little publicity has been attempted by individual manufacturers is the rather chaotic condition which has existed due to the complication of a patent situation, formulae, and production problems.

Today the position has changed entirely, and in the opinion of the manufacturers whose products are described in this article, finishes based on synthetic resins may now be confidently offered to the automotive field. So far as we know now, many useful forms of the modified glyceryl phthalates and phenolic condensates are known and may be definitely controlled in production. Moreover, it is claimed that paint technologists now have sufficient production experience to safely make definite recommendations to anyone interested in exploring the economies offered by these new products.

Air Line to Adopt Tri-Motored Monoplane

The monoplane built by Chantiers Aeronautiques Wibault-Penhoet has accommodations for ten passengers and 660 lb. of baggage besides the pilot and wireless operator

THE above shows a three-engined commercial monoplane built by the Chantiers Aeronautiques Wibault-Penhoet of Paris, which recently passed successfully through the type tests of the French Air Ministry. It carries a pilot, a wireless operator, 10 passengers and 660 lb. of baggage. The machine is equipped with three Gnome-Rhone Titan Major air-cooled radial engines with a rating of 300 hp. each at 1900 r.p.m. The radius with full load is 600 miles without refueling. The machine has a maximum speed of 147.6 m.p.h., a cruising speed of 129.5 m.p.h., and an absolute ceiling of 17,225 ft. It can fly horizontally with one side engine stopped at 9000 ft. and with two engines stopped at 1300 ft. We understood that this machine will shortly be placed in service on several air lines.

Industry Regains Place as Largest Consumer of Steel

(Continued from page 938)

declined $1 a ton to 1.85 cents, Pittsburgh, after they have been reclassified as No. 10 hot-rolled annealed.

Strip steel, because of the greater spread between the capacity of mills and the demand, was under more pressure than any other description of rolled steel. While the market for the hot-rolled at the end of the year is quoted only $1 a ton below the year's opening price, cold-rolled strip yielded $4 a ton from the year's opening quotation. Fender stock No. 20 gage was quoted at 3.10 cents, Pittsburgh or Cleveland, toward the end of the year, whereas at its beginning it was held at 3.40 cents, a decline of $6 a ton.

Rolled Steel Prices

The foregoing epitome of the rolled steel market's price movement in 1931 reflects in most of the products the calm of a swimming pool in a year when steel companies' shares were buffeted almost constantly by tempestuous waves. Lest a false impression be created, it is well to recall to the reader's mind that frequently during the year quotations represented producers' asking prices, representative transactions by way of a market test being more often than not lacking. Time and again during the year it was significantly stated in market reports that prices held steady and unchanged, *except at Detroit.* This was clearly a case of attempting to present the tragedy of Hamlet with the melancholy Dane left out, because if ever Detroit was the battleground of the steel market, it had this distinction in 1931.

A recent development, if it proves successful, will bring galvanized sheets within the range of automotive materials, experimental tonnages having been ordered a few weeks ago to test out their serviceability in parts of trucks and bus bodies.

Pig iron output in 1931 is estimated to have declined more than 40 per cent from 1930. Approximately 18,500,000 tons were produced, compared with 31,400,000 tons in the preceding year and 42,250,000 tons in 1929. Toward the end of the year there were 67 furnaces in blast, compared with 69 during the worst of the 1921 recession. Prices for both malleable and foundry were $1 @ $2 per ton lower toward the end of the year than during its first quarter. Automotive foundries at no time during the year covered their requirements for more than a few weeks ahead, accumulations of stocks at furnace yards being more than ample for prompt compliance with shipping orders.

In the market for both steel and foundry scrap the lowest price levels in a score of years were recorded.

Aluminum alloy pistons continue to be the outstanding form in which that metal finds its way into automotive consumption, although considerable headway is being made in extending its use in heavier shapes, such as strength-members in truck and bus body frames and in paneling and roofing for commercial vehicles. In trucks for hauling heavy materials heat-treated forms of rolled aluminum alloys are used with a view to affording as great a loading capacity as possible and yet holding the weight of the loaded vehicle down to the conventional legal limits. The sole domestic producer of virgin metal markets more and more of his output in a stage of relatively advanced fabrication so that the fact that the contract price for the primary forms remained unchanged throughout 1931 at 22.90 cents for the 98 @ 99 per cent metallurgical grade and at 23.30 cents for the 99 per cent plus metal does not necessarily imply that there were no changes in prices of the shaped products. In the world aluminum market an understanding and marketing agreement was reached by the producers of Europe and Canada and this assures a continuance of orderly market conditions in foreign markets which are usually reflected in the American market.

With the market price for magnesium reduced to 32 cents a pound, that metal and its alloys are coming more and more to the front, both in automobile and airplane parts where light weight is a paramount consideration.

Under the burden of a staggering excess of supply over demand the price of copper, following a feeble upward spurt in March to 10⅛ cents, delivered Connecticut Valley, melted away until in November 6¼ cents, a low record for all time, was reached. In the absence of the usual statistical reports, refinery stocks early in December were estimated to be around 525,000 tons, or about three and one-quarter times the tonnage that went into automotive consumption in the banner year of 1929.

Overproduction of Tin

Tin suffered not only from overproduction, but also from the slump in the value of the pound sterling. From a high of 27 cents for Straits in March the market had sagged to 21 cents early in December. Toward the end of the year the International Tin Committee announced that 1932 output would be pared down to 91,000 tons, compared with 162,000 tons in 1929, in which year automotive consumption was close to 20,000 tons.

Lead opened the year at 5 cents, New York, and gradually declined to 3.75 cents, the quotation in effect early in mid-December, a shrinkage of $25 a ton.

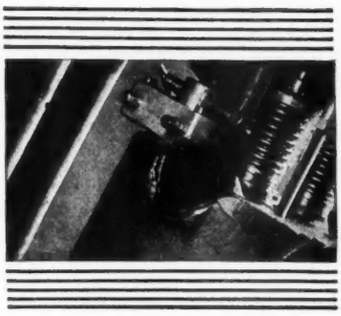
The use of zinc in automotive brasses and die castings and in brake lining wire as well as of rolled metal in running board molding was on the uptrend in 1931. The high for prime Western was 4.05 cents, East St. Louis, in January, gradual declines sending the price to 3⅛ cents, which was the market level early in December.

Automotive Oddities—By Pete Keenan

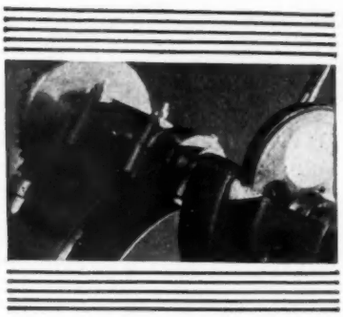
ROADS MADE OF COTTON ARE BEING ADVOCATED IN TEXAS.
THIS AIRPLANE COULD FLY BOTH FORWARD AND BACKWARDS
WM SHAKESPEARE, JR IS PRESIDENT OF AN AUTOMOTIVE EQUIPMENT MANUFACTURING CO. IN KALAMAZOO, MICH.,
JOHN ROBERTS OF EVANSVILLE, IND. PUT HIS FALSE TEETH IN HIS HIP POCKET. HIS CAR WENT OVER A BUMP AND JOHN WAS BADLY BITTEN BY HIS OWN TEETH. Oct 1931.
"ALPINE" A LADY WEIGHING 735 POUNDS RECENTLY PURCHASED A STUDEBAKER. THE CAR HAD TO BE ALTERED BECAUSE OF HER SIZE.
Pete Keenan

Do You Know An "Oddity"?

Correspondence about "Automotive Oddities" is invited. Contributions used will receive editorial mention when practicable. If you are interested in the source of, or the reason for, a particular "Oddity," ask the editorial department of Automotive Industries about it.



NEWS OF THE INDUSTRY



Ford Eight Dooms "Few Changes" Theory

(*Continued from page 939*)

present four. It is also reported that Ford is working on a cheaper car primarily designed for export but which may also be placed on the domestic market if Ford competition should produce cars which undersell the new eight domestically.

Some light is thrown upon the change from the model "T" to model "A" and the proposed change to the eight-cylinder line by the following financial analysis:

The financial figures following are derived from balance sheets filed annually with State of Massachusetts. No Ford income statements are available.

During five year period 1926 through 1930, which includes last full year of Model "T" production, balance sheets indicate total net profits of $86,522,000 on a total production of 6,570,540. This figures out to $13.15 per car indicated net profit. The indicated average return on invested capital was 2.5 per cent.

During the first three full years in which only Model "A's" were produced, production totaled 4,305,910 and indicated net profits $54,038,000, or $12.50 per car. Average indicated return on investment in this three year period is 2.66 per cent.

If indicated losses during 1927, in which last Model T and first Model A were produced, and 1928 (first full year of Model "A" production) totaling $115,008,000, are charged to Model "A" production, all but $11,251,000 of the indicated net profits of $126,259,000 earned in 1929 and 1930, are wiped out.

Year	Invested Capital	Net Profit	Production	Profits or Loss Per Car
1926	733,910	75,271	1,810,029	41.60
1927	685,860	−42,787	454,601	−94.00
1928	605,010	−72,221	854,818	−84.40
1929	688,020	81,798	1,951,092	41.90
1930	736,650	44,461	1,500,000	29.70
		86,522	6,570,540	

Ford Car and Truck Production

Year	Production
1903	195
1903-4	1,513
1904-5	1,695
1905-6	1,599
1906-7	8,759
1907-8	6,181
Model "T"	
1908-9	10,660
1909-10	19,051
1910-11	34,979
1911-12	76,150
1912-13	181,951
1913-14	264,372
1914-15	283,161
1915-16	534,108
1916-17	785,433
1917-18	708,355
1918—Aug. 1, 1919	537,452
Aug. 1, 1919—Dec. 31, 1919	401,982
1920	1,074,336
1921	1,013,958
1922	1,351,333
1923	2,090,959
1924	1,993,419
1925	1,990,995
1926	1,810,029
1927	454,601
Model "A"	
1928	854,818
1929	1,951,092
1930	1,500,000

G. M. Export Reduces Staff

NEW YORK, Dec. 17—General Motors Export division a few days ago made further reductions in its staff.

No official statement has been released by the management, but it is understood that several executives of the company have been transferred to other General Motors divisions, and others have left the organization. James D. Mooney, a vice-president of the parent corporation, continues as head of export operations.

This general scaling-down of the staff follows the trend of reduced sales throughout the world. Overseas volume of the corporation has been greatly reduced at a few points, such as Brazil, where economic depression has been most severe. There it has dropped to 20 per cent of pre-depression volume.

Harry A. Tipper, general sales manager of the export division, has been transferred to the central sales staff of the General Motors Corp.

Handling Institute Formed

CLEVELAND, Dec. 17 — Formation of a Materials Handling Institute, including about 60 manufacturers in the field, has been announced here. F. E. Moore, president of the Mathews Conveyor Co., was elected president of the group. Jervis B. Webb of the Jervis B. Webb Co., Detroit, was elected vice-president; H. W. Standart, president, Northern Engineering Works, Detroit, treasurer, and John A. Cronin, secretary.

Rockne Prices

DETROIT, Dec. 17—Prices on the new Rockne Model 75 have been announced as follows:

2-pass. coupe	$685
4-pass. coupe (rumble)	720
4-door sedan	735

Five de luxe types are offered at an additional cost of $45 over the similar standard types.

Buick Produces 9053

DETROIT, Dec. 1—Buick Motor Co. has reported total production of 9053 passenger cars during November, compared with 5012 during October, and 7177 in November, 1930.

Reeves Reviews Anti-Tax Points

Says Motor Vehicles Most Heavily Burdened of Non-Luxury Articles

NEW YORK, Dec. 15—Alfred Reeves, general manager of the National Automobile Chamber of Commerce, in speaking before the Rotary Club at Ardsley, New York today, protested against proposals of federal, state and local governments to solve their financial troubles by placing increased tax burdens on motor vehicle owners. The automotive industry is too important for the business recovery to be burdened with excessive, discriminatory, and special taxes which constitute class legislation, Mr. Reeves pointed out.

Citing the various federal and state moves to increase the taxation of the motor vehicle, Mr. Reeves said: "Not only are we willing but we fully expect to pay a fair share of whatever additional taxes will be required. However, we will join with the owners of 26,000,000 motor vehicles who are now paying more than a billion dollars annually in special taxes, in opposing measures which would impose upon them an unfair portion of the tax load."

Mr. Reeves also cited five additional arguments against the imposition of additional motor vehicle taxes. These are:

1. Additional levies would raise an artificial barrier to consumption which would adversely affect industrial operations increasing the gravity of the unemployment problem.

2. This would defeat the constant efforts of automobile manufacturers to lower the operating cost of their products.

3. The motor vehicle is already the most highly-taxed form of non-luxury property in the United States. The average annual rate of taxation of such vehicles amounts to 18.3 per cent of its average value during the seven years of its normal life while levies on real estate taxed on the same basis amounts to 2.4 per cent and on farm property 1.6 per cent.

4. Increasing the cost of operating motor vehicles through additional taxation results in limiting the number of persons who can afford to own and operate vehicles. Definite evidence of this is presented in a comparison of the motor vehicle registration figures of 1930 in high tax states with those in low tax states. Of the 10 states having the highest average taxes substantial decreases in registrations were reported in nine while in the 10 low tax states the reverse of this was true. Healthy increases in registrations were recorded in nine states despite prevailing unhealthy business conditions.

5. Increased taxes on motor vehicles would result in higher prices on all commodities and manufactured products most of which are transported over the highways or city streets in their journey from the purchaser to the consumer.

Tire Shipments Decrease

NEW YORK, Dec. 14—Shipments of automobile tires for the month of October amounted to 2,851,653 units, according to the Rubber Manufacturers' Association, Inc. This represents a decrease of 27.5 per cent under September, as compared with the average seasonal decrease of 13.1 per cent, and is also 18.5 per cent below October of last year.

Production for the month amounted to 2,973,755 units, a decrease of 6.2 per cent under September, and 17 per cent below October 1930. Inventories as of October 31 were 8,300,065 units, an increase of 1.7 per cent over Sept. 30 but 15.3 per cent below Oct. 31, 1930.

Develops New Hose

NEW YORK, Dec. 14—Titeflex Metal Hose Co., Newark, N. J., has developed a new all-metal bendable type for use in exhaust tubing, designed so that it will not burn out or unravel when exposed to exhaust fumes. This new pipe can be brazed or welded to fittings. In place of the asbestos or fibrous cord which has been used in the past to make flexible tubing tight, this new tubing has a heat-treated copper wire. It is made in all one-quarter-inch sizes from 1¼ to 4 in. inner diameter.

Cadillac's Share Increases

DETROIT, Dec. 10—During the 10 months ended Oct. 31, Cadillac and La Salle delivered 35.1 per cent of all cars sold in their price group. This figure represents an increase of five per cent over the same period of last year, according to J. C. Chick, general sales manager of the company.

Seiberling Sales Increase

NEW YORK, Dec. 14—Seiberling Rubber Co. reports sales of tires in November, the first month of its fiscal year, as 68 per cent greater than in the corresponding month last year.

Chrysler Offices Moved

DETROIT, Dec. 14—The executive offices of the Chrysler Corp. have been moved into the Chrysler Export Corp. Building at the Highland Park plant.

Steam Power Corp. Formed

NEW YORK, Dec. 14—Steam Power Corp. of America has been organized with offices in the Chanin Bldg., New York, to develop a new steam powerplant for automotive, marine, aeronautic, and industrial use. This powerplant has been developed as a result of 7 years research, and has been tried out for a long period of time on a special bus.

Officers of the new company are: L. E. Wrightmyer, formerly of General Electric Co., division of electrification of steam railways and division of bus transportation, president; A. N. Clifton, vice-president of the Rawl Corp., vice-president and secretary; and G. A. Frantz, president of the Rawl Corp., Baker Motor, Inc., and Steam Appliance Corp., as treasurer.

Gasoline Use Expected to Rise

Economic Group Sees 1.9 Per Cent Gain to June 30, 1932

WASHINGTON, Dec. 17 — Gasoline consumption per average motor vehicle in use is continuing to increase despite the fact that the average number of motor vehicles in use last summer is taken to be less than a year ago, the Volunteer Committee on Petroleum Economics reports to the Secretary of the Interior. The demand for motor fuel was 2 per cent greater in the third quarter of 1931 than in the corresponding period of 1920.

This condition was brought about in part, according to the committee, by the increased use of taxicabs. The average taxicab, or stock automobile converted to "hire use," it was stated, will consume annually from 10 to 15 times as much gasoline as the average private automobile. The number of taxicabs operated in the U· ited States last summer was reported by the committee as approximately 140,000, as compared with 115,000 a year previous.

For the nine months from Oct. 1, 1931, to June 30, 1932, the committee estimated that the domestic motor fuel demand will amount to 289,000,000 barrels, an increase of 1.9 per cent over the previous corresponding period.

Graham Reports Loss

DETROIT, Dec. 14—Graham-Paige Motors Corp. has reported net loss of $1,400,391 for quarter ended Sept. 30, against net loss of $1,347,924 in the same quarter last year.

Net loss for nine months ended Sept. 30 was $2,233,447, against net loss of $2,228,884 in the corresponding period of 1930.

Current assets as of Sept. 30 were $6,897,972, against current liabilities of $2,244,022.

Canadian airway operators numbered five on Dec. 1. These companies were operating 16 regular air services with a total route length of 5454 miles. The figures indicate a reduction since March 1 of this year when 11 companies were operating 26 scheduled services totaling 7426 miles in length.

Quick Action Promised On Spanish Tariff Tilt

Commission Will Consider Request of Industry for Invocation of Reprisal Clause on Imports of Iberian Products, Unless Spain Gives More Consideration to Position of American Vehicles

WASHINGTON, Dec. 17—Chairman Robert L. O'Brien of the Tariff Commission has assured President Alvan Macauley of the National Automobile Chamber of Commerce that the commission will give immediate consideration to the chamber's request made of President Hoover that if Spain maintains its existing discrimination against imports of American motor cars that the United States invoke the penalty provisions of Section 338 of the Hawley-Smoot tariff act against that country. This provision provides for either the assessment of additional duties up to 50 per cent or a complete embargo of products coming from the offending country.

The National Automobile Chamber of Commerce is fully aware that this first test ever made of the provision carries potential possibilities of a far-reaching nature.

Nevertheless, after seriously considering the matter, and giving thought to discrimination after discrimination to which it has been subjected by different countries, the American automotive industry reached the conclusion that the time for the test had come and for it to assert its right if it is to have fair play in the export markets of the world. The industry has complained previously to the White House and other governmental sources about irritating and hurtful discrimination and so far has received little or no relief.

The greatest discrimination against the American industry, however, came with the signing on Oct. 23, 1931, of the Franco-Spanish agreement, effective Nov. 10. By this agreement Spain granted to France materially lowered tariff rates with respect to automobiles, tires, tubes, motorcycles and numerous other products. The benefit of these rates, which are approximately 50 per cent lower than the rates paid by similar American products, have been extended to most of the countries of the world, but not to the United States. No reason has been officially given for the Spanish discrimination, but it is assumed it was meant as a reprisal partially owing of an embargo against malaga grapes from Spain, which have been shut out because of the Japanese fly, and partially because the American tariff act gives protection to domestic products of kinds which Spain desires to ship to the United States.

So extreme is the Spanish discrimination against American cars, that the National Automobile Chamber of Commerce was forced to the realization that it should invoke application of Section 338, inasmuch as the American Embassy at Madrid made repeated futile efforts to persuade Spain to grant most-favored-nation treatment to American exports, as was guaranteed by the Spanish-American agreement signed in 1906.

In addition to the inquiry instituted by the Tariff Commission, which will recommend a course of action to the President, the chamber's request is being given careful consideration by the State Department, which is discussing the matter with the commission and the Department of Commerce, according to a statement of the State Department.

In his telegram of Dec. 10 to President Hoover, it was pointed out by Mr. Macauley that the National Automobile Chamber of Commerce believes that the Spanish discrimination "is a precedent which may lead to similar acts of exclusion by other nations and so result in serious loss in our world trade."

The importance of the step taken by the automotive industry therefore is seen from the fact that it feels that it is fighting against actual exclusion of exports, whose vital effect hardly can be overstated since approximately one-fourth of the output of the American automotive industry normally is shipped abroad. Manifestly, it is the ability to maintain important foreign markets that makes for mass production and much lower cost and selling prices than otherwise would be possible.

The test sought by the American automotive industry actually reflects a pioneer movement that will be a test for all American exporting industries. Its outcome therefore is being awaited with the greatest interest.

The Tariff Commission will first report its findings and recommendation to the President. The first act of the President, should affirmative action be taken, would be to proclaim an increase in duties, up to 50 per cent, if he desires, on all Spanish imports. If Spain maintained its discrimination against the United States a second proclamation could be issued absolutely embargoing all Spanish shipments.

Death automobile accidents during the four weeks ending Nov. 28 in 82 large cities of the United States numbered 819. This figure compares with 811 deaths during the four weeks ended Nov. 29, 1930. Figures are reported by the Bureau of Census.

Light Cycles at British Show

New Tax Rating Gives Them Sales Advantages

LONDON, Nov. 30 (*by mail*)—The annual motorcycle show at Olympia opened today and brought to light a number of new models with smaller engines and lower prices than have ever before been attached to British motorcycles, as distinct from motor-assisted pedal cycles. Five makers show two-speed solos with a 1 hp. (98 c.c.) two-cycle engine made by Villiers, whose two-cycle engines of larger sizes, up to 250 c.c., have for many years past been standardized by a number of motorcycle manufacturers. These new 1 hp. machines have been produced as a result of the tax concession afforded by the Chancellor of the Exchequer in this year's budget, whereby machines with engines of less than 150 c.c. are taxed at half the previous minimum rate, viz., 15 shillings instead of 30 shillings. These new "featherweights" weigh 110-130 lb. and are offered at prices ranging upward from £15.

Other new models include a number of 350 c.c. (and two of 500 c.c.) that have been brought within the maximum weight (224 lb.) of the 30 shillings tax class. But the sensation of the show is a new four-cylinder Brough Superior, which has twin rear wheels set about 8 in. apart. The rear wheels are attached to a live axle (without differential) driven by helical bevel gears set centrally. The engine is made by the Austin Motor Co., and apart from being larger (800 c.c. instead of 747 c.c.) it is almost an exact replica of the engine used in the Austin Seven car. Transmission is by a plate clutch and car-type three-speed gearset and propeller shaft. The price of the solo is £188, but it is intended primarily for use in a luxurious sidecar outfit, not as a speed model.

Making New Pyrometer

NEW YORK, Dec. 14—The Pyrometer Instrument Co. has placed on the market a new pyrometer designed to surmount the difficulties encountered in the use of ordinary thermocouples. It consists of a thermocouple incased in a metal housing, chromium plated, and develops its energy by focusing the radiant heat and light rays of the body to be measured upon this couple.

Advantages obtained are that the tube is not subjected directly to furnace heat, with the consequent deteriorating effect of gases and fumes; the thermocouple, being minute, reacts instantly to temperature changes, and it can be successfully installed in places unsuitable for ordinary thermocouples.

Cadillac Dealers Meet

DETROIT, Dec. 17—Cadillac Motor Car Co. is conducting a two-day dealer meeting beginning today, at which, for the first time, dealers as well as distributors will be present. The purpose of the meeting is to go over sales plans for the coming year. Dealers will be shown the four new lines which represent an expenditure of approximately $6,000,000 for experimental and development, L. P. Fisher, president, states. Mr. Fisher told a representative of *Automotive Industries* that Cadillac has acquired 400 new dealers and has reached sixth place in dollar volume during the past year. Mr. Fisher states that approximately 70 per cent of the company's dealers registered a profit during 1931, an unusually high percentage.

Shows to be Beautified

NEW YORK, Dec. 16—The decorative theme to be employed at the New York National Automobile Show will be an industrial one. Various phases of American industrial life dependent upon the automobile industry will be portrayed in stained glass panels, giving the interior of the building an appearance of a cathedral of industry and commerce. The predominating color on the main floor will be red, that on the second floor light blue, and the third and fourth floors light green. The Coliseum in Chicago will be converted into a conservatory and the balconies transformed into a modern version of the hanging gardens of Babylon.

Petroleum Imports Rise

NEW YORK, Dec. 16 — Imports of petroleum at the principal ports of the United States for the week ended Dec. 12 are estimated by the American Petroleum Institute at 246,000 bbl. daily. This compares with the daily average of 196,714 bbl. for the week ended Dec. 5, and with 212,536 bbl. for the four weeks ended Dec. 12. Crude runs to stills during the week are placed at 2,270,900 bbl. daily. Cracked gasoline produced during the week was placed at 3,400,000 bbl.

Stocks of gasoline at bulk terminals and in transit, east of California, for the week ended Dec. 12, totaled 12,976,000 gal., as compared with 12,884,000 gal. for the previous week, and with 11,778,000 gal. for the week ended Dec. 13, 1930.

Banquet Without Speakers

NEW YORK, Dec. 16—The annual Motor and Equipment Association banquet scheduled for Wednesday evening, Jan. 13, will be held in the Grand Ballroom in the Hotel Astor. The return to the Grand Ballroom from the Astor Roof is welcomed as indicative of a more pleasant affair than even those that have been staged during the past few years.

There will be no speakers at this banquet, the entire entertainment being given over to professional talent. George L. Brunner is chairman of the Banquet Committee, and the other members are E. T. Satchell and C. H. Burr.

Cadillac Payrolls Normal

DETROIT, Dec. 15—Cadillac Motor Car Co. is now operating on a normal payroll of approximately 6000 employees and this payroll probably will be maintained throughout the winter months, according to L. P. Fisher, president.

Between 200 and 300 more men, all former regular employees of the company, will be added to the payrolls within the next few weeks, and Fisher and Fleetwood plants have placed 2000 additional men at work during the past two weeks to take care of Cadillac's increased body requirements, Mr. Fisher said.

In discussing the improved employment situation, Mr. Fisher emphasized the fact that the company is now hiring only former Cadillac men who were previously with the company for a year or more.

Pierce Enters Canada

WALKERVILLE, ONT., Dec. 17—Formation of the Pierce-Arrow Co. of Canada, Ltd., for the manufacture and sale of Pierce-Arrow automobiles in Canada and for export, has been announced by D. R. Grossman, who will be general manager of the new subsidiary of the Studebaker Corp. of Canada. C. N. Galer, who is sales manager of the Studebaker Corp. of Canada, will also act as sales manager of the new organization.

Chrysler Names Bish

J. B. Frazer, general sales manager, Chrysler Sales Corp., has announced the appointment of H. R. Bish as district manager of the Detroit district.

Mr. Bish was previously manager of the Boston district where he is succeeded by Fred Cooper, formerly director of distribution and more recently district manager of the Detroit district.

Beasley Adds Opus

NEW YORK, Dec. 16—"Men Working," a new book by Norman Beasley, published by Harper & Bros., describes the history of the Goodyear Tire & Rubber Co. Starting with the inauguration of the company, the book chronicles its growth through periods of prosperity and depression up through the launching of the U.S.S. Akron.

Caterpillar Promotes 3

J. N. Barnes, C. M. Burdette and F. G. Nunneley have been appointed assistant sales managers in charge of district representatives and a group of dealers for the Caterpillar Tractor Co., Peoria, Ill.

Notes

Porto Rico imported American passenger automobiles to a value of $1,060,759 during the fiscal year ending June 30, 1931, according to a special report from the National City Bank of New York. Imports of passenger automobiles from countries other than the United States had a value of $2,040 during the same period. Imports of motor trucks and buses from the United States during the fiscal year had a value of $500,945, with no imports from other countries.

Iowa Engineering Experiment Station of Iowa State College at Ames has just published its Bulletin No. 106 on "Automobile Operating Costs and Mileage Studies." Robley Winfrey is editor of the Bulletin.

Czecho-Slovakia has recently approved and registered the first sports airplane to be manufactured, both engine and fuselage, in that country.

Bunting Brass & Bronze Co. has opened new branch offices and warehouses in Seattle, Wash., and Detroit, Mich. The Detroit office is located at 447 E. Fort Street.

Sparks-Withington Co. has announced that renewal of its contract with the Hupp Motor Car Co. for horn equipment for another year represents the fifteenth consecutive year that Sparton horns have been used by Hupp. Recent renewals of similar contracts with Studebaker and Franklin continue connections which have endured for long periods.

Failure of the Fiat dealer in Bogota, Colombia, removed the last vestige of European competition from the Colombian automobile market, according to the automotive division, Department of Commerce. European motorcycles, however, continue to dominate in the country.

Aircraft and aircraft engine exports for the month of September, 1931, have been reported by the Department of Commerce. Eleven airplanes valued at $165,837 were exported during the month. Engine exports numbered 28, valued at $98,559. Exports of parts and accessories were valued at $88,589. Shipments to Hawaii had an aggregate value of $1,334, and those to Porto Rico a value of $9,694.

Young Radiator Co., Racine, Wis., announces that it will exhibit at the American Road Builders Show to be held in Detroit, January 11 to 15. Among the items to be exhibited will be new developments in heating cores both for convection heating and unit heating service. Also new developments in cooling for both gasoline and Diesel engines. Water-cooling and oil-cooling will both be covered.

Marmon Motor Car Co. has made arrangements for a permanent showing of its 16-cylinder car in connection with the Isotta-Fraschini in New York. Capt. Hugo V. D'Annunzio, head of the Isotta organization in New York, will handle sales of both cars.

The Perin-Walsh Co., manufacturer of motor truck equipment, is now located in its new Cambridge plant at Fifth and Bent Streets, Cambridge, Mass. Mail should be addressed to the Kendall Square Station, Boston.

The Automobile Association (British) has begun to broadcast, eight times daily, weather reports and forecasts on a wave length of 833 meters. The service is intended for aircraft pilots either in flight or at ground stations, and is the only service of the sort that is available for private pilots in England.

Cities of the United States will compete for the title of "America's Safest City," according to plans now being matured by the National Safety Council. The only obligation assumed by a city entering the contest is to report accidents and mortality figures regularly. All cities will be divided into groups according to population. Local initiative will be the sole guide in carrying out a safety program designed to help the city win the contest.

Auburn Buys Heavily for '32

Orders Totaling $11-000,000 Expected to Cover 3 Months' Needs

AUBURN, IND., Dec. 14 — Orders totaling in excess of $11,000,000 have been let by the Auburn Automobile Co. during the last 10 days for materials to be used in estimated production during the first three months of 1932.

More than 100 companies in 11 states share in these commitments. Approximately $3,000,000 of the total will be spent in Pennsylvania, $2,500,000 in Ohio, $2,000,000 in Indiana and $1,-800,000 in Michigan, while companies in Wisconsin, Missouri, Illinois, New Jersey, New York, Connecticut and Massachusetts share in the remaining total.

This expenditure represents only a fraction of the total sum to be spent during the entire year, Auburn officials said. They pointed out that Auburn turned its inventory 18 times during 1931.

Seek Oldest Crock

DETROIT, Dec. 14—In an effort to locate the oldest automobile in existence in the state, the Detroit Auto Dealers Association will conduct a contest for this purpose in connection with the thirty-first annual auto show to be held at Convention Hall, Jan. 23-30. The contest will be known as "Hunting the Oldest Car in Michigan," and there will be cash prizes offered to the fortunate owners of these antiquated motor vehicles.

Lukens Establishes Fellowship

PITTSBURGH, Dec. 14—Mellon Institute of Industrial Research, Pittsburgh, has announced that the Lukens Steel Co., Coatesville, Pa., has established an industrial fellowship for the investigation of processes in the manufacture of steel plates. Erle G. Hill has been appointed to this fellowship.

Rockne Signs 500

DETROIT, Dec. 17—More than 500 dealers for the Rockne Six have already been appointed, an announcement says. Franchises have been signed for Chicago, Cleveland, Pittsburgh, Omaha, St. Louis, Oklahoma City, Cheyenne, Los Angeles, San Francisco, Seattle, Tacoma, San Diego, Shreveport, Mobile, New Orleans, Clarksburg, Baton Rouge, Nashville, Jackson, Baltimore, Fort Wayne, Columbus, Tulsa, Richmond and many other representative American cities. A force of field representatives is now developing dealers elsewhere. Names of dealers already appointed will be announced within a fortnight.

"We expect to have 1500 Rockne Six dealers before Feb. 1," George M. Graham, vice-president, has stated. "And by the middle of the summer the organization will probably include 5000 retail agencies for the new car," he said.

Sloan to Broadcast

NEW YORK, Dec. 16 — Alfred P. Sloan, Jr., president of General Motors Corp., will speak over the radio Monday evening, Dec. 21, at the regular General Motors hour at 9.30 p. m., Eastern Standard Time. Mr. Sloan will address a Christmas message to the General Motors family, including the employees, stockholders and dealer organization. The program for the evening is a continuation of the General Motors Parade of the States and on this occasion will be devoted to the State of Michigan.

M.E.M.A. Sponsors Meeting

NEW YORK, Dec. 16—The Motor and Equipment Manufacturers' Association will hold a dinner for jobbers in the New York territory on Jan. 5 at the Hotel Astor. George L. Brunner, president of the association and chairman of the National Shows Committee, will speak to the jobbers on "Ways and Means of Utilizing the National Shows to the Greatest Advantage."

Establishes New Division

PEORIA, ILL., Dec. 17—The Caterpillar Tractor Co. has established a special sales division which will handle sales unit engines, radiators, clutches, transmissions, tracks, etc., to other equipment manufacturers. Personnel of the new division, each in charge of sales to a special division of industry, includes W. J. Dukes, G. W. A. Bell, Jr., C. D. Turley, J. H. Howell and Harold G. Tufty.

Mail Houses Reduce Truck Tire Prices

CHICAGO, Dec. 15—Reductions in the price of truck tires ranging from 10 to 15 per cent have been announced by Montgomery Ward & Co. and Sears, Roebuck & Co. It is improbable that either company will announce revised prices for passenger automobiles prior to release of mid-winter flier catalogues within a few days. It is pointed out that price reductions inaugurated by tire manufacturers apply only to their first-line tires and that no revisions have been applied to the second-line grade.

Gasoline Chains Take Big Slice

Independent Filling Stations More Numerous But Get Less Trade

WASHINGTON, Dec. 17—Approximately one-third of the filling station business of the country is done by the so-called chain stations, which number about one-fourth of the stations in the country, according to figures recently compiled by the Census of Distribution.

In 1929 the sales of all filling stations totaled approximately $1,880,-000,000, while the sales of chain stations amounted to $629,024,296. There were 864 filling station chains, operating 30,050 stations, approximately one-fourth of the total.

The distribution report also shows that the average annual sales of chain stations were $20,933 as compared with about $14,000 for independent stations. The chain stations reported a payroll of $81,239,000, of which $79,630,419 was for full-time and $1,608,966 was for 4189 part-time employees.

That the larger chains dominate the filling station chain field is indicated by the fact that more than 49 per cent of the total sales of all the chains was made by 14 chains with 500 stations or more each, which operated a total of 15,886 stations, more than half of all the chain stations in the country. The next largest classification was made up of 25 chains of 100 to 500 stations each, which operated a total of 6144 stations and reported sales of $108,400,000, or 17 per cent of the total.

There were 770 local chains operating 6953 stations, 83 sectional chains operating 15,585 stations, and 11 national chains accounted for 29.8 per cent of the total, and the national chains for 20.9 per cent of the total.

Heads Banquet Committee

William J. McAneeny, president of the Hudson Motor Car Co., has been appointed chairman of the National Automobile Chamber of Commerce Banquet Committee. This committee will have charge of the annual banquet to be staged in conjunction with the National Show on Tuesday evening, Jan. 12. Other members of the committee will be A. G. Bean, Walter P. Chrysler, A. R. Erskine, I. J. Reuter, C. W. Nash and Edsel Ford.

Huber Heads Reclaimers

J. B. Huber of Akron was relected president of the Akron Rubber Reclaiming Co. at the annual meeting of directors here Monday. William Welch and J. M. Alderfer were retained as vice-presidents, and R. J. Houston as secretary.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, Dec. 16—Christmas buying featured retail trade last week. Department stores in some cities reported the volume of sales above that a year ago. However, total sales in terms of dollars are lower all around; for prices have dropped sharply during the year. Those lines of retail trade that are not affected by the holiday stimulus showed no improvement last week. For the most part, collections remained slow. The heavy industries remained dull.

CHAIN STORE SALES

Sales of 43 store chains, including three mail order houses, during November totaled $290,390,225, as against $321,729,795 a year ago. Sales during the first 11 months of this year totaled $3,355,405,194, as against $3,541,918,438 during the corresponding period last year.

ELECTRICITY PRODUCTION

Production of electricity by the electric light and power industry in the United States during the week ended Dec. 5 totaled 1,671,466,000 kilowatt hours, which marks a decrease of 4.3 per cent below that a year ago.

DEPARTMENT STORE SALES

The Federal Reserve Board's preliminary index of department store sales during November stood at 85, as against 86 for October and 84 a year ago. This index is based on the 1923-25 average as 100 and makes allowance both for the number of business days in each month and the usual seasonal changes.

CAR LOADINGS

Railway freight loadings during the week ended Nov. 28 totaled 558,807 cars, which marks a decrease of 142,243 cars below those a year ago and a decrease of 277,503 cars below those two years ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Dec. 12 stood at 67.1, as against 67.6 the week before and 67.8 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City during the week ended Dec. 9 were 25 per cent below those a year ago.

STOCK MARKET

The stock market last week continued its downward course, interrupted only by a temporary rally on Thursday. The volume of trading was light, but there was some increase as the week progressed. Most issues suffered net losses for the week, while some made new lows for the year. Lower sterling rates, the prospects for increased taxation, and further dividend omissions and reductions are regarded as the chief causes of last week's decline.

RESERVE STATEMENT

The Federal Reserve credit in use was further reduced during the week ended Dec. 9. Although holdings of discounted bills increased $7,000,000 and holdings of Government securities remained unchanged, holdings of bills bought in the open market decreased $34,000,000. The reserve ratio on Dec. 9 was 66.1 per cent, as against 65.6 per cent a week earlier and 65.0 per cent two weeks earlier.

May Sell Lockheed Air

DETROIT, Dec. 15—The original plan of splitting Detroit Aircraft Corp. into two units, as reported in these columns some weeks ago, apparently is being given up in favor of a plan calling for the sale of Detroit Aircraft's 80 per cent interest in Lockheed Aircraft of California. Both companies are at present in receivership, but Lockheed has some Government contracts in addition to its transport business.

A tentative decision to follow this plan is said to have been reached following a report by a special committee of stockholders headed by W. W. Nichols, vice-president of D. P. Brown and Co. The proceeds from the sale of Lockheed would be used to reorganize Detroit Aircraft.

Other assets of the company include the Grosse Ile Airport and 409 acres of land; the Metalclad Co. with its patents and rights; shop equipment at both Grosse Ile and Campau St. plant, cash balance, accounts receivable, etc. It was also reported that three inquiries for the purchase of Lockheed have already been received.

Offers Body Jack

NEW YORK, Dec. 14—The Stanley rule and level division of the Stanley Works has developed a new lightweight auto body worker's jack with a 3-ton capacity, that can be used in spaces from 15 in. to 6 ft. It is made up of three extension tubes of seamless drawn-steel tubing, and is operated by a 12-point ratchet, which permits use in close quarters.

Bucyrus-Monighan Declares

CHICAGO, Dec. 16—Directors of Bucyrus-Monighan declared an extra dividend of 20 cents a share on the Class A stock in addition to the regular quarterly payment, bringing the total dividends paid this year to $2. An annual dividend of $1.10 was declared on the Class B stock, which is entitled to ninety cents a share on payment of $1.80 a share on the A stock and thereafter shares equally with the senior stock. Identical payments were declared by the company at this time last year.

Chevrolet Atlanta Active

ATLANTA, Dec. 14—The Chevrolet Motor Co. branch plant in this city is now running six full days a week, according to F. R. Lyness, production manager.

The Fisher Body Co. plant here is also operating at top speed, it was said.

Gets Dardelet License

CHICAGO, Dec. 14—The Automatic Screw Machine Products Co. has been licensed by the Dardelet Threadlock Corp. to manufacture nuts and screw machine products threaded with the Dardelet self-locking screw thread.

Lycoming Begins 12-Cyl. Production

Plant Revamped and $1,000,000 Spent for New Line

WILLIAMSPORT, PA., Dec. 14—Production on Lycoming's new 12-cylinder passenger car engine, under development for the last 18 months, began here today, officials of the Lycoming Mfg. Co. announced.

The new engine, officials stated, is a considerable departure from conventional practices, and will introduce a new field in flexibility and automobile performance to the motoring public. Completed nearly a year ago, it has been under actual road tests since early last April. In these tests, it was stated, gas economy of the engine has proved equal to engines of one-third the horsepower.

Development of the new engine by Lycoming was said to have entailed an expenditure of more than $1,000,000, of which approximately $400,000 was used in designing and engineering, and more than $600,000 for the installation of new machinery, tools, dies, assembly line and new buildings.

In addition to the new assembly line installed for production of the Twelve engine, a complete revamping of the feeder system into the assembly lines of the Lycoming plant here has been made so as to effect more economical and improved handling of materials. The production lines for the straight-eight engine have been rearranged, and new stock, receiving and inspection rooms also installed.

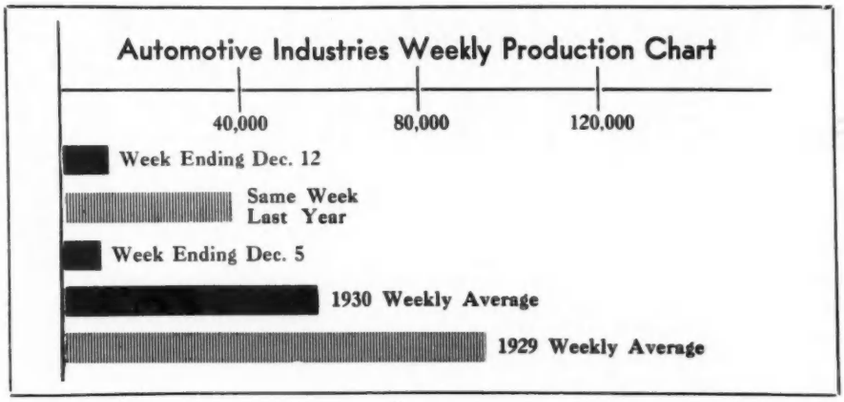
Production plans call for 400 of these 12-cylinder engines by Jan. 1, at which time production will be stepped up to 1600 monthly.

Adds Casting Equipment

RACINE, WIS., Dec. 14—The Iroquois Foundry Co., manufacturer of gray iron and malleable castings, is adding complete brass and aluminum casting equipment to round out its line of products. Fred W. Busche of Milwaukee has been elected vice-president in charge of the new division. He was for 10 years vice-president of the Prime Mfg. Co., Milwaukee, in charge of the foundry division, and later works manager of the Allen-Hough Carryola Co., Milwaukee, manufacturer of portable phonographs, radio specialties, etc. R. L. Niess is general manager of the Iroquois company.

Lincoln Sells 85 at Salon

DETROIT, Dec. 14—Lincoln Motor Co. reports retail sales of 85 new Lincoln 12-cylinder cars at the New York Salon last week.



India Tire Reports Profit

AKRON, Nov. 14 — India Tire & Rubber Co. of Mogadore, Akron suburb, showed a gross profit of $505,952 for the 10-month period ending Oct. 31, President W. G. Klauss reported at a stockholders' meeting Tuesday. Net profit was announced as about a quarter million dollars.

Total sales of $3,665,299 exceeded those of the entire year of 1930, report for the 10 months showed. India this year changed its fiscal year to end Oct. 31 instead at the end of the calendar year, so that no exact comparison of this year's business with that of last is available, President Klauss reported.

A. O. Smith Output Spurts

MILWAUKEE, Dec. 14—A substantial pick-up in delivery specifications for automobile frames in the last fortnight has been responsible for a spurt in the output of the A. O. Smith Corp. The orders are coming from the firm's regular customers, it was announced. Rate of production for the remainder of December will depend on requirements of these makers.

Mesta Lists Stocks

NEW YORK, Dec. 14—Mesta Machine Co., Pittsburgh, Pa., has secured listing on the New York Stock Exchange for 600,000 shares of common stock at $5 par value. Total authorized issue of 1,000,000 shares, of which the 600,000 now listed is all that is outstanding.

The company manufactures engines, castings and heavy steel machinery.

Advocates Driver Training

NEW YORK, Dec. 14—Robbins B. Stoeckel, Commissioner of Motor Vehicles, State of Connecticut, has suggested that automobile drivers who have secured their licenses be given additional training from time to time in driving under uncertain and unfavorable conditions in order that they may be kept proficient and alert to the possibilities of danger which may arise at any time in the course of their operations.

He points out that too frequently the matter of driving becomes so much a habit that the driver is unable to think sufficiently quick enough in the case of emergency and believes that additional training would offset this.

Graham Organizes Branch

NEW YORK, Dec. 14—Graham Motors, Inc., has been organized as a wholly owned subsidiary of Graham-Paige Motors Corp., to act as factory branch for the New York City territory, succeeding the C. H. Jennings Corp.

Ray A. Graham is president of the new company and is assisted by a board of directors, including Robert C. Graham, F. Russell Valpey, Francis J. Dufficy, Henry Harris, Charles W. Sanford and John J. Toole.

Federal Business Increases

DETROIT, Dec. 14—Federal Motor Truck Co. reports an increasing volume of new business, headed by a recent order of 15 1½-ton Federals, equipped with dump bodies, which were ordered by the State of Illinois. The trucks will be used for repair and maintenance work on the roads throughout the state.

Continental Names Long

Ray A. Long has been appointed assistant general sales manager of Continental Motors Corp., according to an announcement made by L. J. Kanitz, general sales manager.

Mr. Long has been associated with Federal Motor Truck, Chalmers Motor Car Co., Saxon Motor Car, and was chief engineer of the Columbia Motor Car Co.

Buhl Concentrates on 'Giro

DETROIT, Dec. 15—Buhl Aircraft Corp. has concentrated its activities on the development of its new pusher type autogiro at St. Clair, Mich. Buhl formerly maintained a factory also at Marysville, Mich. The first of the autogiros is expected to be completed for test flights this month.

Opposes Federal Tax

WILMINGTON, DEL., Dec. 14—Proposed Federal taxation of gasoline was strongly opposed by J. Borton Weeks, president of the American Motorists' Association and the Keystone Automobile Club, in an address made at the annual meeting of the Delaware Automobile Association, A.M.A., here last week. "A Federal tax on top of the already excessive tax on gasoline," he said, "would prove a calamity to the average motorist. It would tend to prolong the depression in the automobile industry by frightening away prospective buyers of cars and would cause owners to use their automobile less frequently than they do now," he said.

Radio Transformer Offered

CHICAGO, Dec. 16—A device designed to supply power to the B circuit of an automobile radio has been placed on the market by the Janette Manufacturing Co. of this city. It is operated from the regular storage battery of the car and transforms the 6-volt current of the battery into direct current at 180 volts. The consumption of battery current of this device, which is known as the Janette Auto B Power, is said to be low.

Mathis Uses Own Engine

In the report of the Paris automobile show it was stated that the new model straight eight Mathis was equipped with an American engine. The Mathis Co. of Strasbourg, France, points out that this engine is built entirely in its own factory. The cylinders are cast in an electric foundry at the Strasbourg works. This is the first electric foundry to be laid down by any French automobile manufacturer.

To Make Bus Seats

CHATHAM, ONT., Dec. 14—Motor and Coach, Limited, this city, has acquired the manufacturing rights for Kelton-Aurand bus seats and this product will be supplied from the Chatham plant in future. They are marketed under the name of Kamco Bus Seats.

Offers Noise Consultation

HARTFORD, CONN., Dec. 14—The Maxim Silencer Company has established, as an addition to its regular business, a consulting service which will specialize in the solution of noise problems. It is headed by Dr. Hiram Percy Maxim, the inventor of the Maxim silencer.

Dodge Adds Dealers

DETROIT, Dec. 16—Eleven direct dealers and 334 associate dealers have been added by Dodge Bros. in the last three months, A. vanDerZee, general sales manager, reports in a current factory bulletin.

Manchurian Arsenal Produces Trench Mortars and TRUCKS

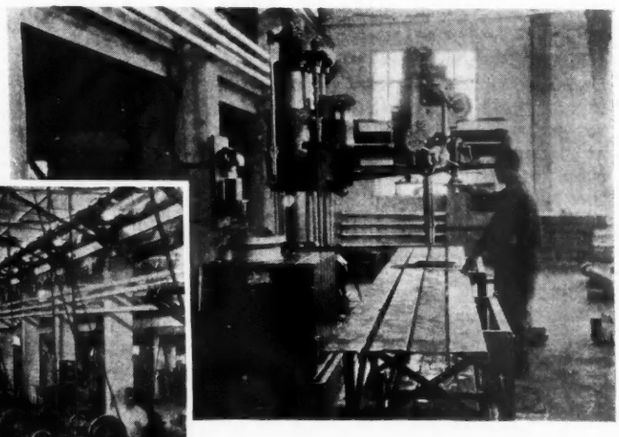
Liaoning Industrial Works, Associated With Munitions Plant, Produces First Chinese Commercial Unit After 18 Months of Planning. American Engineer heads project

First description of the Chinese venture appeared in *Automotive Industries* for Aug. 8. A picture of the truck was shown. Pictures of the works producing it have now been made available through the courtesy of the Automotive Division, Bureau of Foreign and Domestic Commerce

The body-building shop of the Liaoning works occupies the modern building above

The "Chung Shan" chassis shown is the second to be completed and was displayed at the recent Good Roads Exhibition in Shanghai

(Below) The lathe shop of the Liaoning works turns out parts for trench mortars while it is making truck components. Fuzziness of the picture is due to necessity of taking time exposure in a land where flashlight bulbs are hard to obtain



(Above) American channel irons act as work holders for a radial drilling machine manufactured in Great Britain. Many American units are used in the completed trucks, which are built to S.A.E. standards

Recent International Class Speed Records

(Recognized by the International Association of Recognized Automobile Clubs)

Record Distance or Time	Start	Date	Place	Sponsor	Driver	Make of Car	No. of Cylinders	Bore	Stroke	Displacement in C. C.	Time or Distance Run H. M. S. 1/100	Speed in Kilometers	Speed in M.P.H.
						Class I							
1 M.	S	October 11	Tat	V. de Strasser	V. de Strasser	D.-K. W.	2	68.2	68	496.81	1′ 01″ 87	93.642	58.19
						Class D							
10,000 K.	S	Oct.22-Nov.1	Montlhery	Yacco Oil Co.	Marchand Fortin Delepine Combette	Citroen	6	72	100	2,442	92 h. 37′ 16″ 39	107.967	67.09
10,000 M.	S	Oct.22-Nov.1	Montlhery	Yacco Oil Co.	Marchand Fortin Delepine Combette	Citroen	6	72	100	2,442	149 h. 48′ 35″ 48	107.426	66.75
15,000 K.	S	Oct.22-Nov.1	Montlhery	Yacco Oil Co.	Marchand Fortin Delepine Combette	Citroen	6	72	100	2,442	139 h. 48′ 48″ 57	107.286	66.66
15,000 M.	S	Oct.22-Nov.1	Montlhery	Yacco Oil Co.	Marchand Fortin Delepine Combette	Citroen	6	72	100	2,442	222 h. 38′ 56″ 29	108.422	67.37
20,000 K.	S	Oct.22-Nov.1	Montlhery	Yacco Oil Co.	Marchand Fortin Delepine Combette	Citroen	6	72	100	2,442	185 h. 42′ 05″ 34	107.700	66.92
25,000 K.	S	Oct.22-Nov.1	Montlhery	Yacco Oil Co.	Marchand Fortin Delepine Combette	Citroen	6	72	100	2,442	230 h. 23′ 32″ 78	108.511	67.43
48 H.	S	Oct.22-Nov.1	Montlhery	Yacco Oil Co.	Marchand Fortin Delepine Combette	Citroen	6	72	100	2,442	5.163 k. 919	107.582	66.85
3 Days	S	Oct.22-Nov.1	Montlhery	Yacco Oil Co.	Marchand Fortin Delepine Combette	Citroen	6	72	100	2,442	7.772 k. 223	107.948	67.08
4 Days	S	Oct.22-Nov.1	Montlhery	Yacco Oil Co.	Marchand Fortin Delepine Combette	Citroen	6	72	100	2,442	10.224 k. 740	106.508	66.18
5 Days	S	Oct.22-Nov.1	Montlhery	Yacco Oil Co.	Marchand Fortin Delepine Combette	Citroen	6	72	100	2,442	12.851 k. 816	107.098	66.55
6 Days	S	Oct.22-Nov.1	Montlhery	Yacco Oil Co.	Marchand Fortin Delepine Combette	Citroen	6	72	100	2,442	15.468 k. 588	107.421	66.75
7 Days	S	Oct.22-Nov.1	Montlhery	Yacco Oil Co.	Marchand Fortin Delepine Combette	Citroen	6	72	100	2,442	18.068 k. 237	107.549	66.83
8 Days	S	Oct.22-Nov.1	Montlhery	Yacco Oil Co.	Marchand Fortin Delepine Combette	Citroen	6	72	100	2,442	20.702 k. 216	107.824	67.00
9 Days	S	Oct.22-Nov.1	Montlhery	Yacco Oil Co.	Marchand Fortin Delepine Combette	Citroen	6	72	100	2,442	23.395 k. 397	108.312	67.30
						Class H							
1 K.	F	October 28	Brooklands	Viscount Ridley	Viscount Ridley	Ridley Special	4	66	54.6	747.2	21″ 12	170.455	105.92
200 K.	S	October 31	Brooklands	Sir H. Austin	L. P. Driscoll	Austin	4	55.9	76.2	748	1 h. 22′ 11″ 02	146.014	90.73
200 M.	S	October 31	Brooklands	Sir H. Austin	L. P. Driscoll	Austin	4	55.9	76.2	748	2 h. 12′ 11″ 52	146.091	90.78
500 K.	S	October 31	Brooklands	Sir H. Austin	Driscoll and Cushman	Austin	4	55.9	76.2	748	3 h. 28′ 02″ 18	144.206	89.61
500 M.	S	October 31	Brooklands	Sir H. Austin	Driscoll and Cushman	Austin	4	55.9	76.2	748	5 h. 32′ 55″ 50	145.018	90.11
3 H.	S	October 31	Brooklands	Sir H. Austin	L. P. Driscoll	Austin	4	55.9	76.2	748	436 k. 379	145.460	90.38
6 H.	S	October 31	Brooklands	Sir H. Austin	Driscoll and Cushman	Austin	4	55.9	76.2	748	870 k. 219	145.037	90.12

K—Kilometer(s) M—Mile(s) S—Standing start F—Flying start

Vance and Hoffman Given Added Duties

A. R. Erskine, president of the Studebaker Corp., announces that H. S. Vance and Paul G. Hoffman will serve in the following capacities with various Studebaker subsidiaries:

Mr. Vance will remain as vice-president of the corporation in charge of engineering and production, and will also serve as president of the newly organized Rockne Motors Corp., which will manufacture and market a new, low priced car, the Rockne Six, as announced in *Automotive Industries*.

Mr. Hoffman will continue as vice-president of the corporation in charge of sales, and will also serve as president of the Studebaker Sales Corp. of America; president of the Studebaker Corp. of Canada, Ltd.; president of the Studebaker-Pierce-Arrow Export Corp., and president of S.P.A.R. Sales Corp., the latter being a newly organized subsidiary which will handle, through 12 parts depots, parts for Rockne, Pierce-Arrow and Studebaker passenger cars and trucks.

Mr. Erskine retains the presidency of the Studebaker Corp., Pierce-Arrow Motor Car Co. and S.P.A. Truck Corp.

L. A. Young Declares

DETROIT, Dec. 14—L. A. Young Spring & Wire Co. declared a 25-cent dividend payable Jan. 2 to stockholders of record Dec. 18. The company paid a 50-cent dividend in the previous quarter, prior to which the stock was on a $3.00 annual basis.

G. M. Sales In November Off

Difference in Introductory Date of Chevrolet Cited in Announcement

NEW YORK, Dec. 14—General Motors sold to consumers in the United States 34,673 units during November, as compared with 41,757 units for the corresponding month of last year. The corporation does not regard this comparison as particularly unfavorable in view of the fact that last year the Chevrolet was introduced around the middle of November, whereas this year the introduction was delayed until Dec. 5.

Sales to dealers in the United States totaled 23,716 units, as compared with 48,155 in November, 1930. Sales to dealers throughout the world were 29,359, as compared with 57,257 a year ago.

Delivers Camshafts by Air

MILWAUKEE, Dec. 14—The Ladish Drop Forge Co. shipped 3500 lb. of camshafts by air to the Muskegon Motor Specialties Co. at Muskegon, Mich., last week. The shipment was delivered in one day, part of it going across Lake Michigan on each of the three regular flights made by the Kohler Aviation Corp.

General Motors Sales for November and Comparative Months, 1931-28

Sales to Consumers in United States

	1931	1930	1929	1928
October	49,042	57,757	114,408	109,789
November	34,673	41,757	68,893	70,414
December	.....	57,989	44,216	25,435

Sales to Dealers in United States

	1931	1930	1929	1928
October	21,305	22,924	98,559	91,428
November	23,716	48,155	39,745	27,672
December	.....	68,252	36,482	27,779

Total Sales to Dealers in U. S. and Canada Plus Overseas Shipments

	1931	1930	1929	1928
October	25,975	28,253	122,104	120,876
November	29,359	57,257	60,977	47,587
December	.....	80,008	40,222	35,441

Unit sales of Chevrolet, Pontiac, Oldsmobile, Oakland, Buick, LaSalle and Cadillac passenger and commercial cars are included in the above figures.

Offers Replacement Engines Complete

General Motors Truck Begins New Service Function

DETROIT, Dec. 14—Completely remanufactured engines as replacements for truck engines needing overhauls or major repairs, saving truck operators costly time through loss of time feature a plan just inaugurated by the General Motors Truck Co., Pontiac, Mich.

Through operation of this plan, any General Motors Truck owner can now order through any General Motors Truck branch, distributor or dealer a remanufactured engine to replace the motor in his truck with the result that the truck need be kept out of service only the few hours necessary to remove the old engine and install the replacement unit, which can be done at night if desired.

Engines returned to the factory for replacement are entirely disassembled and all parts regarding which there may exist a doubt as to their wearing properties are immediately discarded. All other parts are cleaned and inspected. Cylinder blocks are rebored, main bearings are replaced and line reamed, and connecting rods rebabbitted and aligned.

These parts then enter an engine assembly line in exactly the same manner as an entirely new engine with all necessary new parts, such as pistons, rings, valves, etc. Each remanufactured engine is then dynamometer tested for several hours. The exchange service cost compares favorably with the old-time overhaul prices, it is claimed.

German Trucks Must Keep to Schedules

WASHINGTON, Dec. 14—Truck freight lines in Saxony, Germany, must adhere strictly to the freight schedules established by the Reich, according to Paul J. Revelry, vice-consul at Leipzig, in a report made public through the Commerce Department. The penalty for violation of this act is a fine of 100 times the difference between the official Reich rate and the one charged to the customer by the owner of the truck. Passenger bus lines are not materially affected by the order, Vice-consul Revelry said.

Simplifies Knock Testing

WASHINGTON, Dec. 14—With the increasing attention recently being paid to the detonation properties of internal combustion engine fuels, the large number of detonation ratings being made constitute an expense of considerable magnitude, according to the Bureau of Standards. The Bureau has studied this question from all angles. It has been found that, with suitable adjustment of the testing apparatus, only one-fifth of the present number of comparison, or reference, fuels are required. With proper technique, equal precision may be obtained by this method of testing.

A four-bowl carburetor proposed by the Bureau, and developed jointly with Cooperative Fuel Research, reduces by one-third the quantities of reference fuel required for a test. Together, these improvements are said to reduce the time required for a test to less than half that formerly required.

Cites Need for New Patent Policy

In his annual report for the fiscal year which ended June 30, 1931, Dr. George K. Burgess, director of the Bureau of Standards, refers to the need for a uniform patent policy for the Government with respect to patents developed in the service. The patent policy of the Bureau of Standards always has been that patentable devices developed by employees paid out of public funds belong to the public. The visiting committee, during the past three years, has given most careful consideration to this subject and strongly indorses the Bureau's policy of public ownership of such patents. Dr. Burgess states that if this is thought to be desirable as a general policy by the administration, the end can be attained by the President setting up, through executive order, as a condition of employment such regulations as may be deemed necessary.

Develops Sand Spreader

NEW YORK, Dec. 14—Universal Road Machinery Co. has developed a sand and gravel spreader powered either with a Continental or LeRoi engine. This spreader has an over-all length of 31 ft. 10 in., and a maximum width of 9 ft. 2 in.

It is equipped with heavy-duty pneumatic tires on the front wheels and solid tires on the rear wheels. It weighs approximately 5000 lb. and has a capacity for distributing up to 60 tons of sand or gravel on the road per hour.

Lincoln Employing 2850

DETROIT, Dec. 14—A total of approximately 2850 men are now employed at the Lincoln Motor Co. plant which is engaged in the production of the new 12-cylinder Lincoln, it has been announced.

The employment total is approximately the same at this date as it was at the peak of the production season last spring, and the number is being increased steadily. An average of 100 former Lincoln workmen have been summoned back to work each week since early in October.

Soss Has New Hinge

NEW YORK, Dec. 14—Soss Mfg. Co., Roselle, N. J., has developed a new forged-steel covered-joint hinge especially designed for use on steel doors. The door section of the hinge is of one-piece construction, with projecting flange to cover the space between the door and the body sections of the hinge.

Auto-Lite Declares

NEW YORK, Dec. 14—Electric Auto-Lite Co. has declared a regular quarterly dividend of $1 on common and $1.75 on 7 per cent preferred stock, payable Jan. 2 to stockholders of record Dec. 16.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

Buenos Aires, S. A., Automobile.Dec. 18-27
National Automobile, New York..Jan. 9-16
San Francisco, Automobile.....Jan. 9-16
Newark, N. J., Automobile.....Jan. 16-23
Omaha, Neb., Automobile.....Jan. 16-23
Toledo, Ohio, Automobile.....Jan. 16-22
Cincinnati, Automobile .....Jan. 17-23
Milwaukee, Wis., Automobile...Jan. 17-23
Philadelphia, Automobile .....Jan. 18-23
Louisville, Ky., Automobile....Jan. 18-23
Boston, Mass., Automobile.....Jan. 23-30
Minneapolis, Minn., Automobile.Jan. 23-30
Hartford, Conn., Automobile...Jan. 23-30
Detroit, Automobile .....Jan. 23-30
Montreal, Automobile .....Jan. 23-30
Baltimore, Automobile .....Jan. 23-30
Pittsburgh, Pa., Automobile...Jan. 23-30
Portland, Ore., Automobile.....Jan. 23-30
Springfield, Mass., Automobile..Jan. 25-30
Harrisburg, Pa., Automobile...Jan. 25-30
Seattle, Wash., Automobile.....Jan. 25-30
St. Petersburg, Fla., Automobile, Jan. 27-29
National Automobile, Chicago, Jan. 30-Feb. 6
Salon, Chicago .....Jan. 30-Feb. 6
Washington, D. C., Automobile Jan. 30-Feb. 6
Cleveland, Automobile ....Jan. 30-Feb. 6
Springfield, Ill., Automobile.....Feb. 4-6
Plainfield, N. J., Automobile.....Feb. 6-13
St. Paul, Automobile.....Feb.6-13
St. Louis, Automobile.....Feb. 7-13
Denver, Colo., Automobile.....Feb. 8-13
Salon, Los Angeles, Calif.....Feb. 13-20
Kansas City, Automobile.....Feb. 13-20
Mankato, Minn., Automobile...Feb. 17-20
Peoria, Ill., Automobile.....Feb. 17-21
Holyoke, Mass., Automobile...Feb. 18-22
Des Moines, Iowa, Automobile..Feb. 21-26
Wichita, Kan., Tractor and Power Equipment .....Feb. 23-26
Salon, San Francisco, Calif..Feb. 27-Mar. 5
Albany, N. Y., Automobile..Feb. 27-Mar. 5
Berne, Switzerland, Automobile.Mar. 11-20
National Aircraft, Detroit, Mich..Apr. 2-10

CONVENTIONS

American Roadbuilders Association, Detroit, Mich. .....Jan. 11-14, 1932
S.A.E. Annual Dinner, New York City, Jan. 14
S.A.E. Annual Meeting, Detroit, Mich., Jan. 25-29

BARBER-COLMAN

FOR CYLINDER REAMING

Barber-Colman Cylinder Reamers are rugged enough in type to withstand the shocks of production-line service and maintain the hairspring adjustment so essential to successful cylinder reaming. Shanks and bodies are hardened throughout. . . . The more than usual number of wedge-locked blades, sharpened by our own carefully worked-out formulas, produces a smooth shearing cut without chatter. These staunchly-built tools are furnished either with shanks integral or detachable. The latter type may be readily redressed to offset the misalignment of worn centers. . . . The right hand spiral of our roughing reamers promotes fast free cutting while the left hand spiral of the finishers adds to the smoothness of finish. No pains have been spared to make these reamers practical. Write us for full information.

BARBER B-C COLMAN

BARBER-COLMAN COMPANY

General Offices and Plant

ROCKFORD, ILLINOIS, U. S. A.

NEW DEVELOPMENTS
Automotive Parts, Accessories and Production Tools

Worm Gear Reduction Unit

A recent addition to the worm gear reduction units manufactured by the Cleveland Worm & Gear Co., Cleveland, Ohio, is designed to transmit up to about 7½ hp., the capacity depending on the reduction ratio and worm speed. This unit is furnished in both horizontal and vertical types, and is designated size 70. Horizontal units

are built with the worm below or above the gear, designated type AT or RT, respectively. In the type VT vertical the gearshaft extends upward, the gearshaft of the type VD extending downward. The type AT is shown.

All shafts of this model unit are mounted in anti-friction bearings, the gear shaft mounting of the vertical type being such that the unit will withstand an external axial thrust downward of 2000 lb.

A range of nine standard ratios, varying from 4⅝:1 to 60:1, can be shipped immediately from stock. A list of fifteen special ratios is also available, the cost of a special ratio being slightly higher and delivery a little longer.

Pioneer Compass for Airplanes

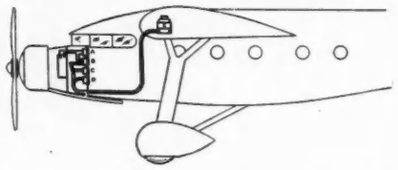
A remote-reading magnetic compass for use on airplanes has been placed upon the market by the Pioneer Instrument Co., Brooklyn, N. Y. The compass proper may be placed at a point of the ship where magnetic disturbances due to the engine are a minimum, while the direction controller and steering indicator are placed on the instrument board in the cockpit.

The Pioneer Telepoint compass consists of four major units, which are briefly described in the following:

The magnetic director is the direction-responsive element and is, in effect, a liquid rheostat which is controlled by a magnetic directional element similar to that used in the Pioneer Straightway magnetic compass. It is energized by any 12-volt source of supply. The airplane's storage battery is generally utilized but, as the the current consumption is only four-tenths ampere, dry cells may be used.

The sensitivity adjuster enables the pilot to regulate the sensitivity of indication of the Telepoint compass. This permits him to obtain compass indicating characteristics in accordance with his own desires under all flying conditions.

The direction controller is purely a mechanical device. It is connected to the magnetic director by means of a flexible shaft. Rotation of the controller causes a corresponding orientation of the magnetic director. The direction controller carries a dial similar to a magnetic compass card. Any desired compass heading can be set



into the controller by means of a crank which rotates the dial.

The steering indicator is a zero-center galvanometer which is connected by an electric cable to the magnetic director.

One method of installation of the Telepoint compass is illustrated by the drawing reproduced herewith.

Automatic Measuring, Cutting and Stripping Machine

The Artos Engineering Co., Milwaukee, Wis., manufacturers of an automatic wire cutting and stripping machine of the floor-mounted type, announces the addition of a bench-mounted model to fill the demand for a moderate priced machine for plants where production is not large enough to warrant the installation of the larger machine.

The new Type CS No. 6 Bench-mounted Machine will automatically measure and cut wire to any desired length within the range given for the machine and in the same operation will strip the insulation from one or both ends. The change from one cutting length to another is simple, requiring the adjustment of only one lever by means of an adjusting nut. The stripping length is adjustable from a minimum of ⅛ in. to a maximum of 1½ in. on either end. This machine is primarily designed for short cutting lengths up to 15 in.; however, attachments can be supplied whereby maximum cutting lengths of 30 in., 45 in., 60 in. and 90 in. can be obtained. Production capacity for lengths up to 15 in. is 3000 pieces per hour; for longer lengths, it varies from 1500 pieces per hour between 15 in. and 30 in. lengths, down to 500 pieces per hour for lengths from 60 in. to 90 in. The machine will handle all sizes of wire up to No. 12 B & S Gage.

Grob Filing Machine

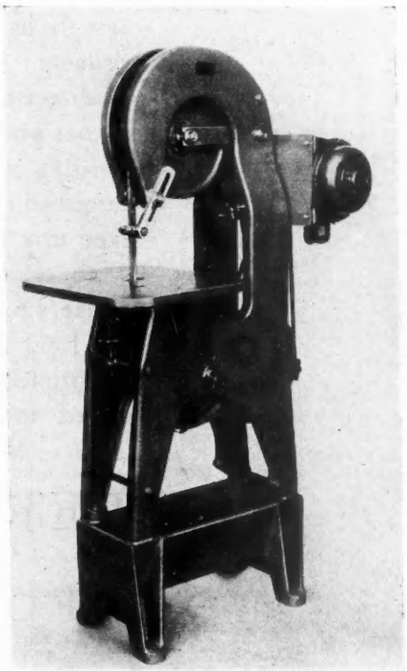
A new floor-type continuous band filing machine, Type A-2, has just been placed on the market by Grob Brothers, West Allis, Wis. It is designed particularly for speed and accuracy in filing and lapping of punches, dies and miscellaneous parts.

The two sheaves approximately 13 in. diameter in size, over which the file-chain operates, as well as the reduction drive pulley, are mounted on ball bearings.

Positive drive of the chain is obtained through a series of equally spaced drive-pins mounted in the lower sheave and matching with the links of the chain. The drive-pins are located in the center of the groove in which the chain operates and are cushioned by helical springs so that they can adjust themselves properly to the links of the chain.

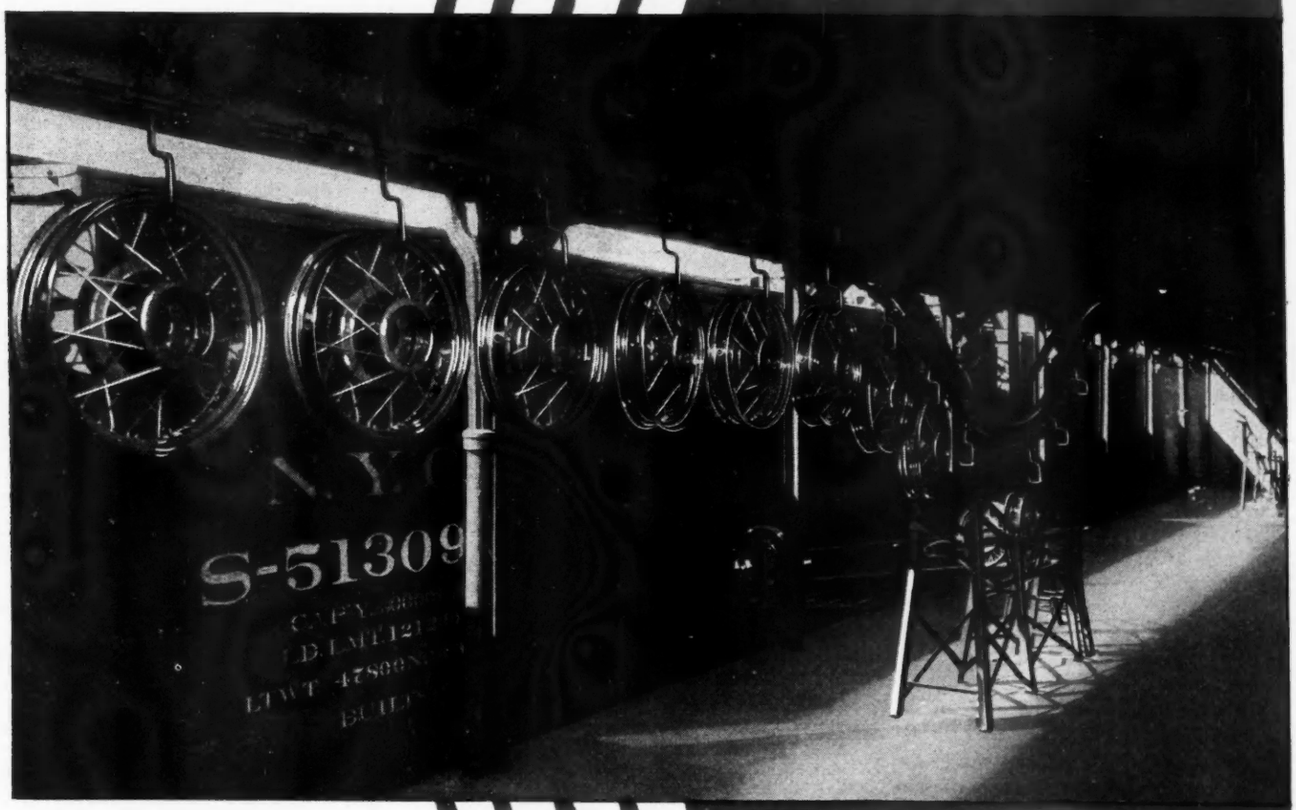
Proper tension on the file-chain

(Turn to page 974, please)



KELSEY-HAYES

PLANT FACILITIES



The most up-to-date and efficient production methods are used in every operation in the building of Kelsey-Hayes wire wheels.

The illustration shows a chain conveyor system by which Kelsey-Hayes wheels are carried from the end of the assembly line directly into freight cars for shipment. This is typical of the modern methods in vogue in every Kelsey-Hayes department.

WOOD
WIRE
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WHEELS

KELSEY-HAYES WHEEL CORPORATION
DETROIT - - MICHIGAN

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

is by means of a hand wheel at the right which actuates the upper sheave through a hinged bracket. The hand wheel is cushioned by a helical spring and an adjustable pin mounted on the frame of the machine close to the spring acts as a stop against the hand wheel as soon as the spring is properly compressed.

The replaceable back-support over which the files slide is hardened and accurately ground. The files are firmly guided against the ground surface of the back-support by means of a roller covered with special tough, yet flexible rubber.

The tiltable work table is 17 in. x 21 in. and positively adjustable by a hand wheel directly in front under the table. Fine adjustments for different angular settings are made with ease. The table is 39 inches above the floor and the space between the surface of the table and the frame is 7¼ in. The overall height of the machine is 63 in.; the base is 15 in. x 24 in. It is equipped with a ½ hp. ball bearing motor. Total weight, uncrated, 500 pounds.

Platform Type Brake Tester

A new model of brake testing machine, operated by compressed air, has been announced by the Youngstown Steel Car Corp., Niles, Ohio. The

brakes are caused to operate by anchoring the front axle of the car to the machine and then moving level platforms under the wheels back and forth. These platforms are evenly guided and the maker claims they do not tilt or wobble. The braking action thus produced is the same as that occurring in road operation of the car, although it is produced in the reverse way, the road (platform) moving instead of the car.

Operation is controlled and test readings are made from one central location. Separate gages record the retarding forces developed by each brake throughout the full range from the free to the locked position.

The platform - type Youngstown brake tester is only 12 in. high and is movable from one position to another by simply adjusting the air line connection. Cars with wheelbases of from 95 to 144 in. are handled without adjustment. Front and rear air jacks, jacking platforms and air lines for tire inflation are available as extra equipment.

Niagara Double-Crank Press

Features of safety, convenience and operating control are provided in the new electrically controlled double-crank press of large size recently built by the Niagara Machine & Tool Works, Buffalo, N. Y. This press has an electro magnetic clutch and brake operating in conjunction. Electric push button control of the slide motion is so arranged that four different methods of operation may be selected and the control locked for the desired method, thereby preventing tampering with the safety features. A central pressure lubricating system is also provided.

Four optional control settings may be arranged as follows:

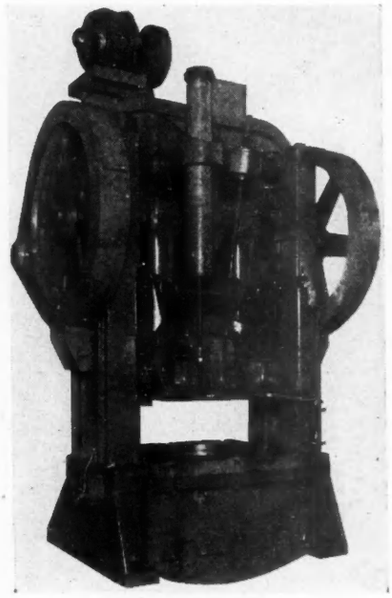
1. The most safe method of operation is given by setting the control for the use of the push buttons on the slide itself. When these are depressed, the slide will descend to the bottom of the stroke after which the buttons may be released and the slide will return to the top of the stroke where it stops automatically.

2. "Inching" operation is provided by setting control and using upper button on right hand housing (shown in the illustration), the slide operating continuously as long as this button is depressed and stopping instantly at any position in the stroke when the button is released. This control is most conveniently used in setting dies.

3. When it is desired to cause the slide to make the complete cycle, stopping at top of the stroke, the control may be arranged so that this is done by a depression and release on push buttons on slide. As long as the buttons are kept depressed the slide will continue to repeat its cycle.

4. When continuous operation for roll feed mechanism is required, the control may be set so that the press is started by use of the upper button on the right-hand housing. The operation continues automatically until the lower button on the housing is depressed.

The clutch used in this press is of the multiple disk type. The magnetic



operation is such that the friction surfaces are engaged gradually, permitting smooth acceleration and preventing a grabbing effect. The clutch is built into the flywheel which has anti-friction bearings and runs free on the shaft.

The electro-magnetic brake operates in conjunction with the clutch, being automatically released when the clutch is engaged and instantly applied to stop the press when the clutch is disengaged. The brake mechanism is a separate unit and mounted apart from the clutch so that no heat from the brake is transmitted to the clutch.

Barber-Colman Hygrostats

A Hygrostat, designed to meet the demand for an inexpensive, well constructed instrument for controlling humidifying apparatus by electrical means, has recently been added to the "*Electric* System of Temperature Control" of Barber-Colman Co., Rockford, Ill. This instrument is essentially an automatic two-way switch operated by changes in the length of a wood cylinder as it reacts to changes in atmospheric moisture content. The Hygrostat not only actuates controlled mechanisms on a variation of less than 4 per cent in relative humidity, but indicates the existing humidity by means of a pointer and scale mounted in the instrument.